COMPAQ

ProLiant DL760 Servers

Maintenance and Service Guide

First Edition (March 2001)
Part Number 173771-001
Spare Part Number 234212-001
Compaq Computer Corporation

Notice

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About This Guide

This maintenance and service guide can be used for reference when servicing Compaq ProLiant DL760 servers.

WARNING: To reduce the risk of personal injury from electric shock and hazardous energy levels, only authorized service technicians should attempt to repair this equipment. Improper repairs could create conditions that are hazardous.

IMPORTANT: The installation of options and servicing of this product shall be performed by individuals who are knowledgeable of the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase.
FILENAMES	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in uppercase.
Type	When you are instructed to *type* information, type the information **without** pressing the **Enter** key.
Enter	When you are instructed to *enter* information, type the information and then press the **Enter** key.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Symbols on Equipment

These symbols may be located on equipment in areas where hazardous conditions may exist.

This symbol in conjunction with any of the following symbols indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.

This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

This symbol indicates the presence of electric shock hazards. The area contains no user- or field-serviceable parts. Do not open for any reason.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.

This symbol on an RJ-45 receptacle indicates a Network Interface Connection.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching it.

These symbols on power supplies or systems indicate the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

42–62 kg

93–137 lb

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

Rack Stability

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single rack installation.
- The racks are coupled together in multiple rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

Airflow Requirements

The Compaq ProLiant DL760 server draws cool air in through the front door and exhausts warm air through the rear door. Therefore, the front door of the rack must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the rack. Do not block the ventilation apertures. Clearance from the back of the rack to the rear of another rack or row of racks should be at least 48 inches.

CAUTION: If a third-party rack is used, the following minimum requirements should be observed to ensure adequate airflow to the server:

- Front and rear doors should have 64% open area (equivalent to 830 square inches of space on a 42U rack) for airflow with holes evenly distributed from top to bottom to permit adequate air flow.
- Side clearance between the installed server and the side panels of the rack must be a minimum of 2.75 inches.

CAUTION: If not all of the vertical space in the rack is filled by components, the gaps left will cause a change in airflow through the rack and across the components. Cover these gaps with rack blanking panels.

High Airflow Rack Door Insert

The increased power of new processor technology requires increased cooling efficiency for rack-mounted servers. The new Compaq Rack 9000 series provides enhanced airflow for maximum cooling, allowing these racks to be fully loaded with servers using the latest processors.

When installing this server in Compaq Rack 7000 and 4000 series racks, the new processor technology requires the installation of a new Compaq High Airflow Rack Door Insert, if the rack has a LEXAN front door.

Compaq Technician Notes

WARNING: Only authorized technicians trained by Compaq should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module-level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or make modifications to any printed wiring board. Improper repairs can create a safety hazard. Any indications of component replacement or printed wiring board modifications may void any warranty.

WARNING: To reduce the risk of personal injury from electric shock and hazardous energy levels, do not exceed the level of repair specified in these procedures. Because of the complexity of the individual boards and subassemblies, do not attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs could create conditions that are hazardous.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- If the system has multiple power supplies, disconnect power from the system by unplugging all power cords from the power supplies.
- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.

CAUTION: To properly ventilate your system, you must provide at least 30.5 cm (12 inches) of clearance at the front and back of the computer.

CAUTION: The computer is designed to be electrically grounded. To ensure proper operation, plug the AC power cord into a properly grounded AC outlet only.

Access Panel Label and Indicators

A significant amount of information about server configuration and options installation is provided on the panel labels. As shown in Figure 1, these labels are located on the top of the unit and on the sides of the Processor and Memory Module. To access the appropriate label, see "Figure 1" and "Table-1".

NOTE: These labels do not contain warning and caution information. Refer to this guide or to the option documentation for the applicable warnings and cautions.

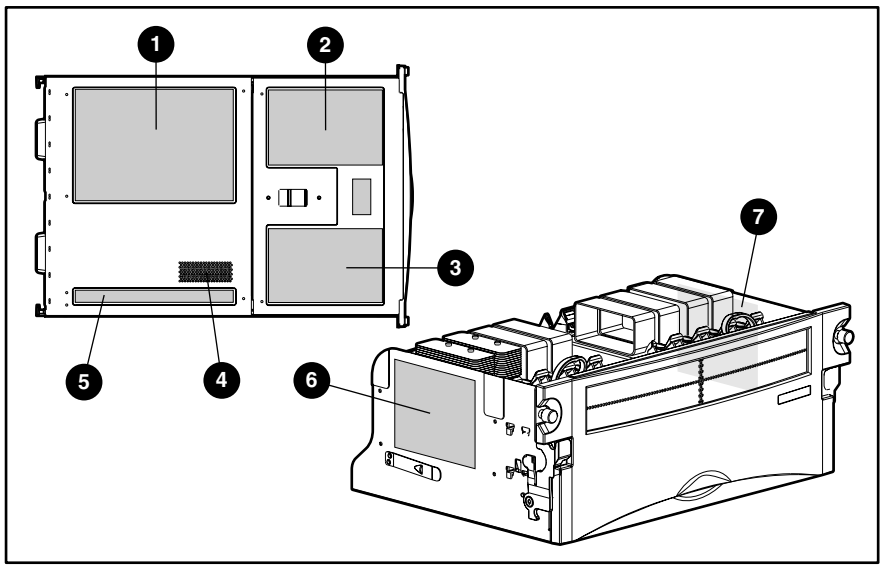

Figure 1. Location of labels and indicators

Table-1
Location of Labels and Indicators

Item	Component	Item	Component
❶	I/O board information	❺	Additional I/O information
❷	Options installation	❻	Processor board configuration
❸	Module access	❼	Memory installation
❹	System Interlock Status Indicators		

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Help Sources

The following sources contain additional information:

- User documentation
- *Compaq Service Quick Reference Guide*
- Service training guides
- Compaq service advisories and bulletins
- Compaq QuickFind
- Compaq Insight Manager
- Compaq Download Facility: Call 1-281-518-1418

Compaq Technical Support

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed in the *Worldwide Telephone Numbers* booklet included with your product or available on the Compaq website:

http://www.compaq.com

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial number, model name, and module number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website by logging on to the Internet and pointing your browser to

http://www.compaq.com

Compaq Authorized Reseller

For the name of your nearest Compaq authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

Integrated Management Display

Some Compaq server models include a Compaq Integrated Management Display (IMD), an integrated, 16 x 4 character display mounted on the front of the server. This display provides easy-to-use menu-driven access to server information, including model number, LCD firmware revision, and POST operations.

Chapter **1**

Illustrated Parts Catalog

This chapter provides the illustrated parts breakdown and a spare parts list for the Compaq *ProLiant*™ DL760 server. See the table following each illustration for the names of referenced spare parts.

System Chassis Exploded View

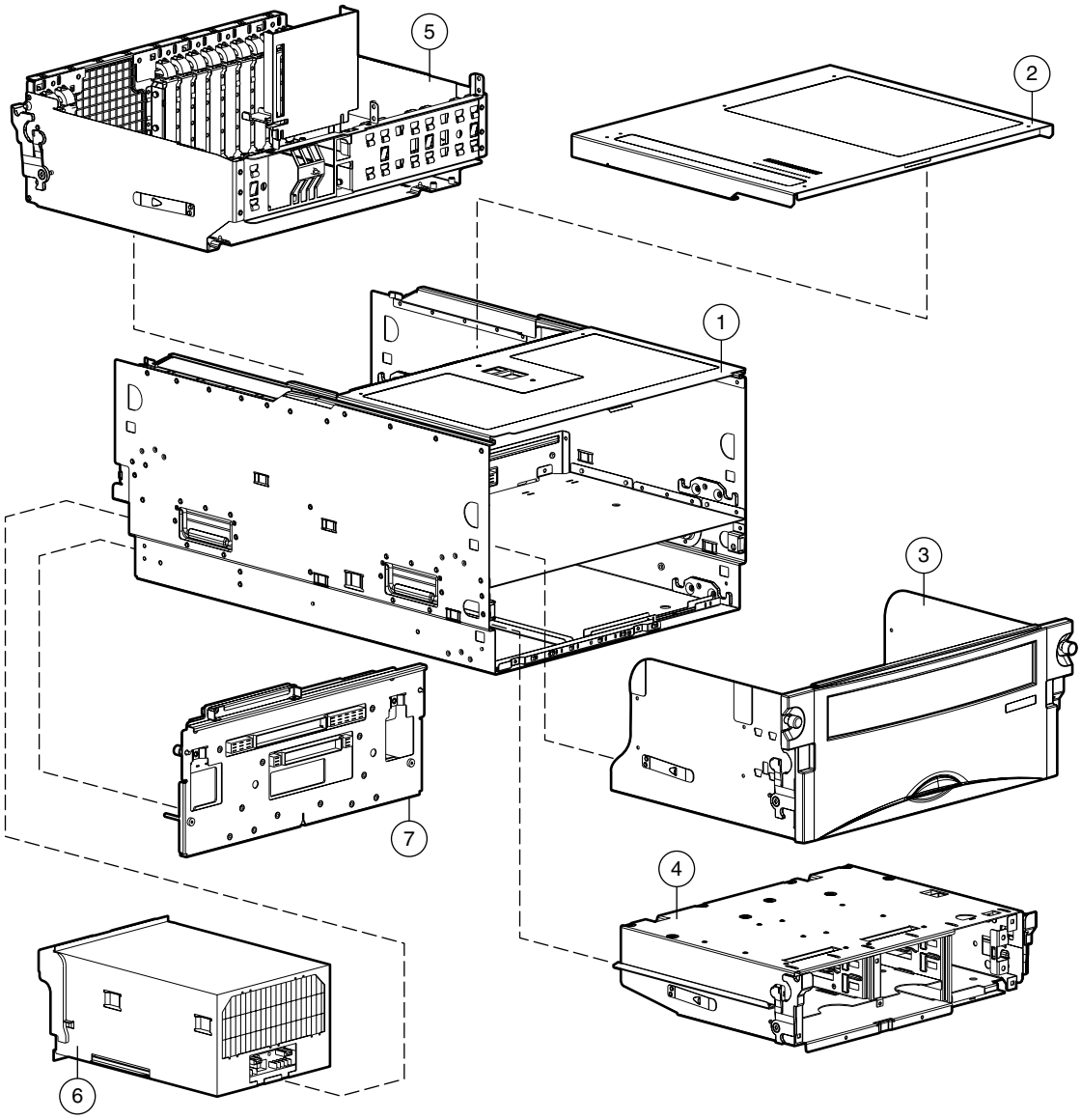

Figure 1-1. System chassis exploded view

Table 1-1
System Chassis Parts List

Item	Description	Spare Part Number
SYSTEM CHASSIS		
1	System chassis	122231-001
2	Top access panel	122214-001
3	Processor and Memory Module (with system board)	122216-001
4	Media module	146446-001
	a) Drive tray module*	
	b) Drive cage assembly*	
	c) Integrated Management Display (IMD)*	
	d) CD-ROM/1.44-MB diskette drive*	
	e) Media module bezel*	
	f) Bezel screws (Quantity 4)*	
5	I/O module with PCI-X I/O board	180447-001
SYSTEM COMPONENTS		
6	Hot-Plug power supply 1150 W	122235-001
BOARDS		
7	System midplane assembly	122234-001

*Not shown

Processor and Memory Module Exploded View

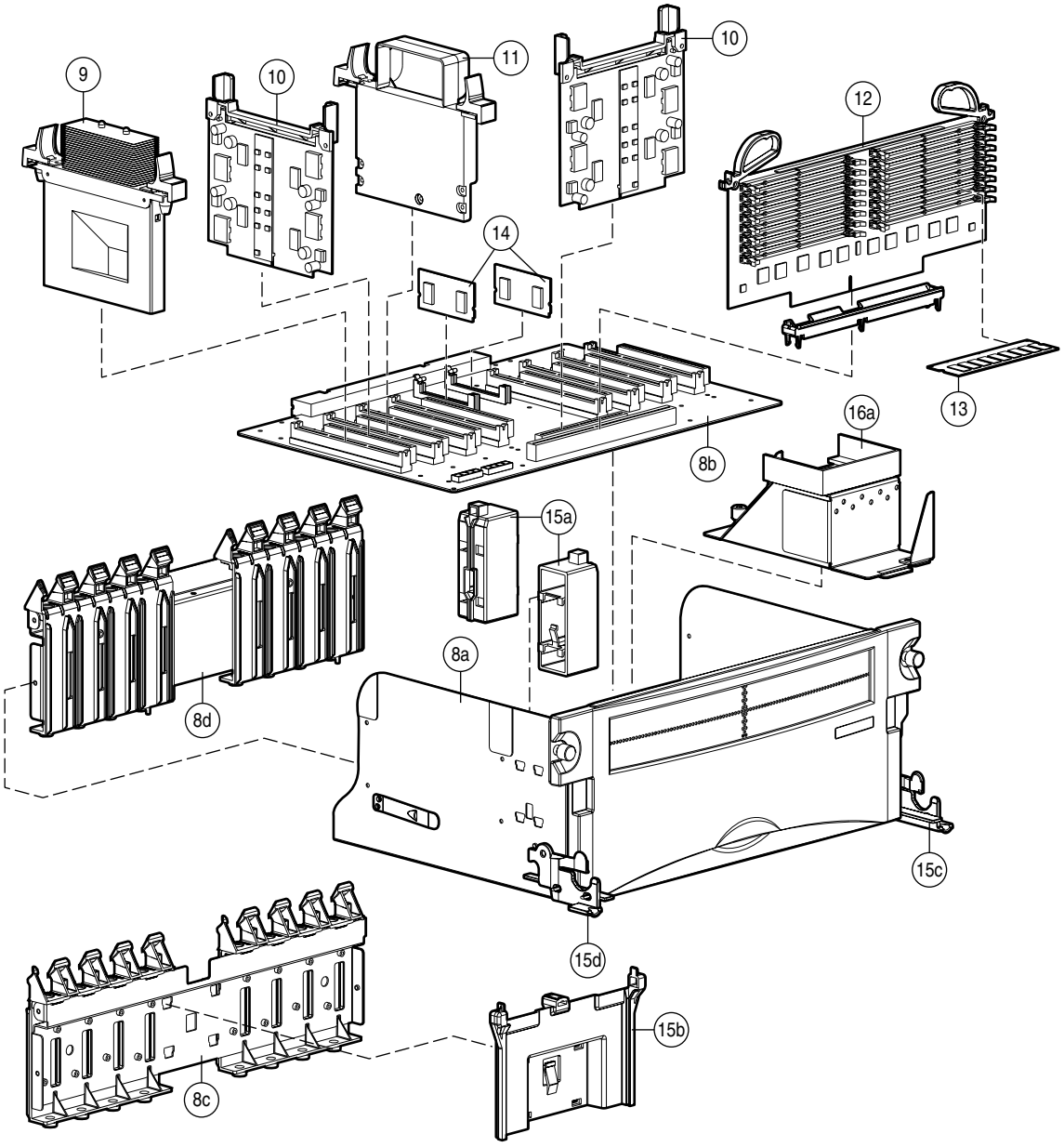

Figure 1-2. Processor and Memory Module exploded view

Table 1-2
Processor and Memory Module Spare Parts List

Item	Description	Spare Part Number
MODULE COMPONENTS		
8	Processor module with processor board	122216-001
	a) Processor module	
	b) Processor 8P/Memory host board	
	c) Processor guide, front	
	d) Processor guide, rear	
	e) Processor Power Module (PPM) guide*	
	f) Memory guide (Quantity 2)*	
	g) Memory board insertion guide*	
	h) Air baffle assembly*	
	i) Neoprene bumpers (Quantity 2)*	
	j) Black keeper*	
PROCESSORS		
9	Processor, 700 MHz with 1-MB cache and heatpipe	178943-001
	Processor, 700 MHz with 2-MB cache and heatpipe	178944-001
	Processor, 900 MHz with 2-MB cache and heatpipe	232388-001
10	Redundant Processor Power Module	312257-001
11	Processor terminator board	122224-001
MEMORY		
12	Memory board	122215-001
13	Memory module, 128-MB, 64-MB CL2 (Quantity1)	146488-001
	Memory module, 256-MB, 128-MB, CL2 (Quantity 1)	146489-001
	Memory module, 512-MB, 128-MB, CL2 (Quantity 1)	146490-001
	Memory module, 256-MB, 64-MB, CL2 (Quantity 1)	170514-001
	Memory module, 512-MB, 256-MB, CL2 (Quantity 1)	170515-001
	Memory module, 512-MB, 128-MB, CL3 (Quantity 1)	170516-001
	Memory module, 512-MB, 256-MB, CL3 (Quantity 1)	170517-001
	Memory module, 1-GB, 256-MB, CL2 (Quantity 1)	170518-001
	Memory module, 1-GB, 256-MB, CL3 (Quantity 1)	170519-001
14	Cache Accelerator (Quantity 2)	143887-001

continued

Table 1-2
Processor and Memory Module Spare Parts List *continued*

Item	Description	Spare Part Number
MISCELLANEOUS		
15	Plastics kit	123185-001
	a) Memory guide right and left (Quantity 2)	
	b) Terminator PPM guide	
	c) Module ejector, right front (Quantity 2)	
	d) Module ejector, left front (Quantity 2)	
	e) Fan cage plenum*	
	f) Plenum, 9 slot, top*	
	g) Plenum, 2 slot*	
	h) I/O plenum, 9 slot*	
	i) Port PCI retainers (Quantity 11)*	
	j) I/O slot double guide*	
	k) I/O slot triple guide*	
	l) I/O ejector, right*	
	m) I/O ejector, left*	
	n) Black keeper*	
	o) CPU module ejector, right*	
	p) CPU module ejector, left*	
	q) Memory card insertion guide*	
16	Miscellaneous hardware kit	123187-001
	a) Processor module air baffle cover	
	b) I/O center support bracket*	

*Not shown

Media Module Exploded View

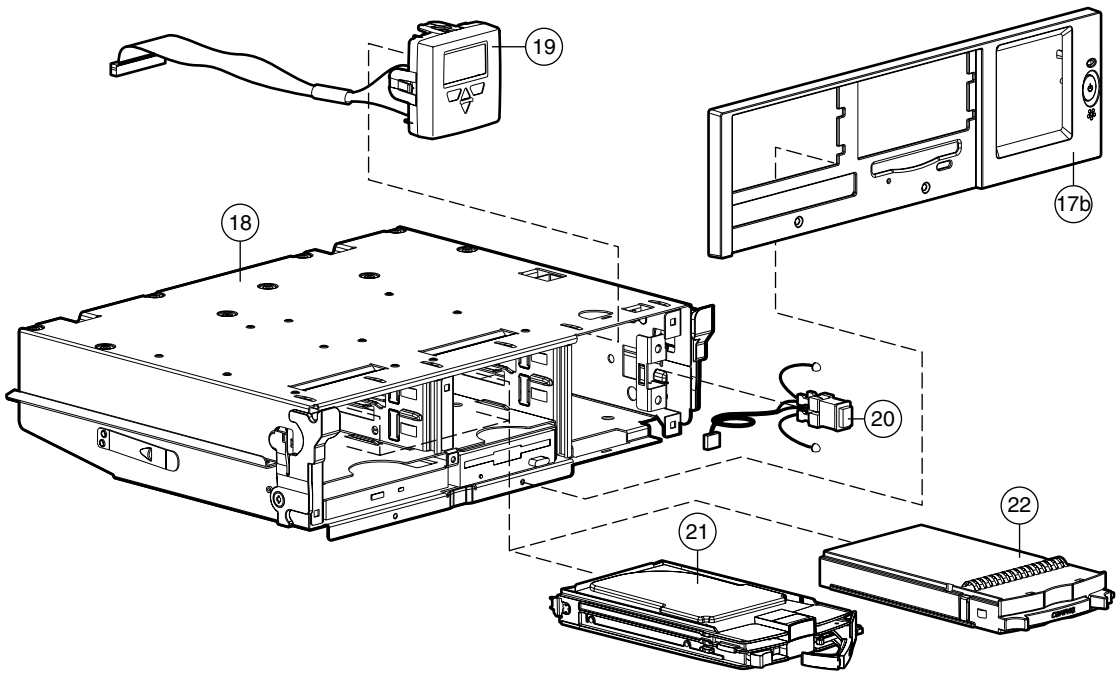

Figure 1-3. Media module exploded view

Table 1-3
Media Module Spare Parts List

Item	Description	Spare Part Number
CHASSIS		
17	Front bezel kit	122236-001
	a) Processor bezel*	
	b) Media bezel	
	c) IMD blank panel*	
ASSEMBLIES		
18	Media module	146446-001
19	IMD with cable	122223-001
20	Power switch assembly with LED	122233-001
MASS STORAGE		
21	Wide Ultra2 hard drive with tray, 9.1-GB, 1-inch, 7200 rpm	104665-001
	Wide Ultra2 hard drive with tray, 18.2-GB, 1-inch, 7200 rpm	104663-001
	Wide Ultra3 hard drive with tray, 9.1-GB, 1-inch, 10000 rpm	152188-001
	Wide Ultra3 hard drive with tray, 18.2-GB, 1-inch, 10000 rpm	152190-001
	Wide Ultra3 hard drive with tray, 36.4-GB, 1-inch, 10000 rpm	177986-001
	Wide Ultra3 hard drive with tray, 9.1-GB, 1-inch, 15000 rpm	189393-001
	Wide Ultra3 hard drive with tray, 18.2-GB, 1-inch, 15000 rpm	189395-001
22	LVDS 1-inch hard drive blank	122759-001

*Not shown

I/O Module Exploded View

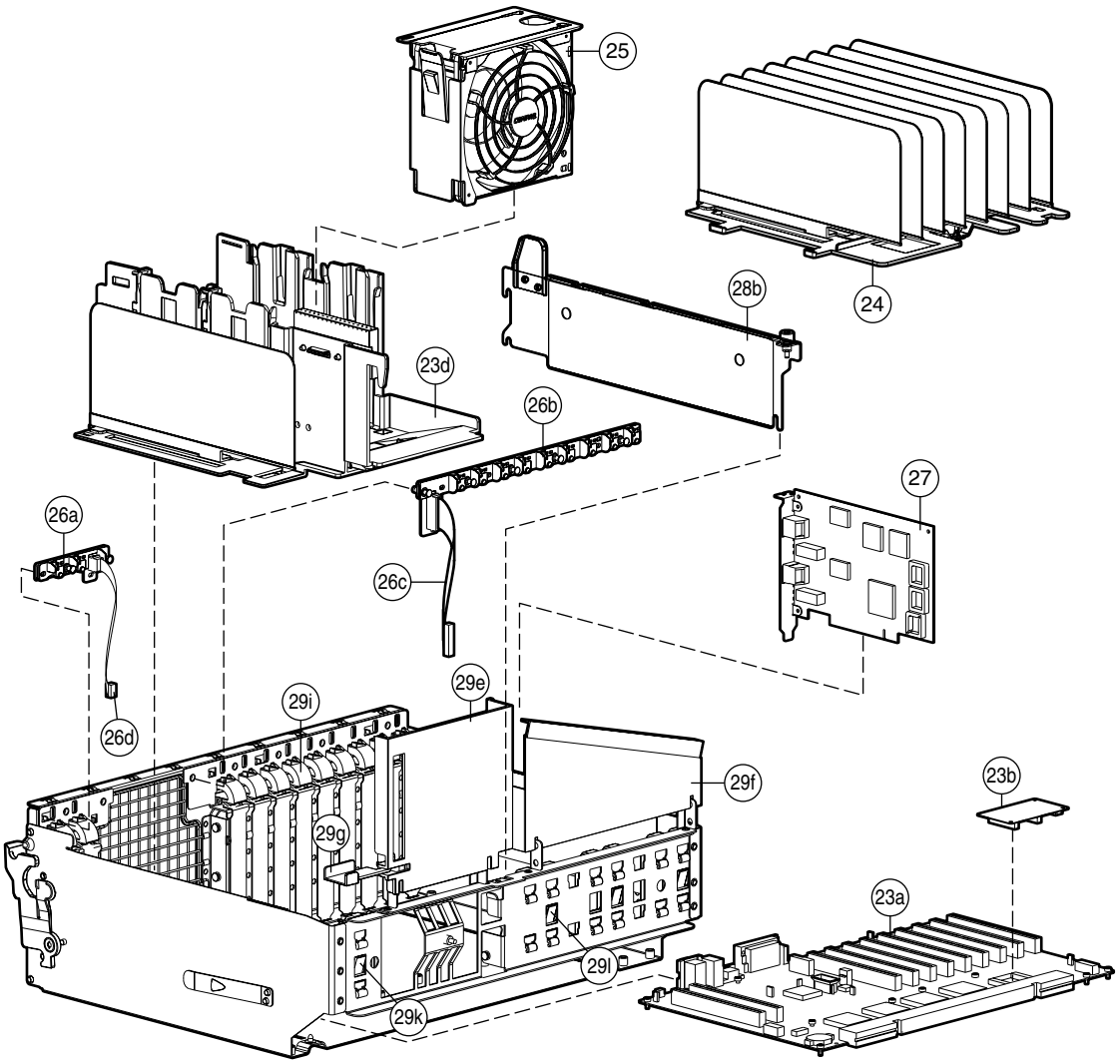

Figure 1-4. I/O module exploded view

Table 1-4
I/O Module Spare Parts List

Item	Description	Spare Part Number
CHASSIS		
23	I/O module (with I/O board)	180447-001
	a) PCI-X I/O board	
	b) Array enabler board (replacement part is Item 38, Table 1-5)	
	c) I/O module assembly*	
	d) Fan cage	
	e) Fiber optic fan cage CA assembly*	
	f) Hot-pluggable fan interface*	
	g) PCI POC divider*	
	h) Fiber optic fan plenum CA assembly*	
	i) Hot-pluggable basket, 9 slot*	
	j) PCI Hot Plug 10P, 15.3 inch CA assembly*	
	k) PCI Hot Plug 40P, 6 inch CA assembly*	
	l) RILOE CA assembly, extender*	
ASSEMBLIES		
24	Hot-pluggable basket, 9 slot	122230-001
25	Hot-pluggable I/O fan	122225-001
BOARDS		
26	PCI Hot Plug interface board with cables	122228-001
	a) Lever PCB with insulation and latches, 2 slot	
	b) Lever PCB with insulation and latches, 9 slot	
	c) PCI Hot Plug 10P, 15.3 inch CA assembly	
	d) PCI Hot Plug 40P, 6 inch CA assembly	
27	NC3134 10/100 TX UTP NIC	161105-001
MISCELLANEOUS		
28	Miscellaneous hardware kit*	123187-001
	a) Processor module air baffle cover*	
	b) I/O center support bracket	

continued

Table 1-4
I/O Module Spare Parts List *continued*

Item	Description	Spare Part Number
29	Miscellaneous plastics kit	123185-001
	a) Memory guide right and left (Quantity 2)*	
	b) Terminator PPM guide*	
	c) Module ejector, right front (Quantity 2)*	
	d) Module ejector, left front (Quantity 2)*	
	e) Fan cage plenum	
	f) Plenum, 9 slot, top	
	g) Plenum, 2 slot	
	h) I/O plenum, 9 slot*	
	i) Port PCI retainers (Quantity 11)	
	j) Memory board connector guide front*	
	k) I/O slot double guide	
	l) I/O slot triple guide	
	m) Black keeper*	
	n) CPU module ejector, right*	
	o) CPU module ejector, left*	

*Not shown

Table 1-5
Miscellaneous Spare Parts List

Item	Description	Spare Part Number
MISCELLANEOUS		
30	Miscellaneous screw kit*	123186-001
	a) Module ejector screws (Quantity 6)*	
	b) CD shoulder screws (Quantity 3)*	
	c) Diskette drive shoulder screws (Quantity 3)*	
	d) Diskette drive fastening screw (Quantity 1)*	
31	Miscellaneous cable kit*	123184-001
	a) PCI Hot Plug switch cable, 9 slot*	
	b) PCI Hot Plug switch cable, 2 slot*	
	c) Diskette drive power cable*	
	d) CD-ROM drive cable*	
	e) Diskette drive data cable*	
32	Cable management arm, 28-inch rails, slides*	123188-001

continued

Table 1-5
Miscellaneous Spare Parts List *continued*

Item	Description	Spare Part Number
33	SCSI adapter (50/68)*	189638-001
34	Country kit*	152406-001
35	Return kit*	123189-001
36	Maintenance and service guide*	234212-001
37	Internal battery*	179322-001
38	Integrated Array Enabler Board*	122232-001
39	Ethernet loopback RJ-45*	317465-001
40	Fan controller board*	122226-001
41	Long SCSI cable*	146447-002

*Not shown

Chapter **2**

Removal and Replacement Procedures

This chapter provides subassembly/module-level removal and replacement procedures for Compaq ProLiant DL760 servers. After completing all necessary removal and replacement procedures, run the Diagnostics program to verify that all components operate properly.

To service Compaq ProLiant DL760 servers, you might need the following:

- Flat-blade screwdriver (four millimeter)
- Torx T-15 screwdriver
- Phillips screwdriver
- From the Compaq *SmartStart*™ for Servers CD:
  - ROM-Based Setup Utility (RBSU) software

    NOTE: For more information on RBSU, refer to the *ROM-Based Setup Utility User Guide.*
  - Drive Array Advanced Diagnostics software (DAAD)
  - Array Diagnostics Utility software (ADU)

Electrostatic Discharge Information

A discharge of static electricity can damage static-sensitive devices or microcircuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. To prevent electrostatic damage, observe the following precautions:

- Transport products in static-safe containers, such as conductive tubes, bags, or boxes.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
- Cover workstations with approved static-dissipating material. Use a wrist strap connected to the work surface and properly grounded tools and equipment.
- Keep the work area free of nonconductive materials, such as ordinary plastic assembly aids and foam packing.
- Make sure you are always properly grounded when touching a static-sensitive component or assembly.
- Avoid touching pins, leads, or circuitry.
- Always place drives PCB assembly-side down.
- Use conductive field service tools.

System Interconnect Status LED Indicators

Compaq ProLiant DL760 servers ship with system interconnect status LED indicators. These 17 LED indicators provide a closed-loop checking mechanism for verifying proper component mating and interconnections between critical server components. The indicators provide a visual aid to assist in isolating which components to check if the server will not power up. These LED indicators are located in the I/O module and can be viewed through the top access panel. See Chapter 4, “Connectors, Switches, and LED Indicators,” for more information.

Preparation Procedures

System power in Compaq ProLiant DL760 servers does not completely shut off with the front panel Power On/Standby switch. The switch toggles between On and Standby, rather than On and Off. The Standby position removes power from most electronics and the drives, but portions of the power supply, the Integrated Management Display (IMD), the system interlock circuitry, and some internal circuitry remain active. You **must** disconnect all power cords from the server to completely remove all power from the system.

WARNING: To reduce the risk of electric shock or damage to the equipment, disconnect power from the server by unplugging all power cords from either the electrical outlet or the server. In systems with multiple power supplies, you must disconnect all the power cords to completely remove power from the system.

IMPORTANT: It is necessary to be knowledgeable about electrostatic discharge information before conducting the preparation procedures. For electrostatic discharge information, see “Electrostatic Discharge Information” earlier in this chapter.

Hot-Pluggable Parts

Before beginning the removal of any serviceable parts, determine whether the part is hot-pluggable or not hot-pluggable. If it is hot-pluggable, do not perform a power shutdown of the server. The access panels can be removed while the server is powered up without causing a system shutdown. When the server is in Standby mode, portions of the power supply, auxiliary power (+5V), and some internal circuitry will remain active.

Non-Hot-Plug Parts

If any serviceable parts are not hot-pluggable, then the server must be shut down. Non-hot-plug parts include the processor, Processor Power Module, system board, memory board, and DIMMs.

IMPORTANT: It is not necessary to turn off the server to replace hot-plug devices, such as PCI Hot Plug power supplies or hot-plug fans.

Before beginning any of the removal and replacement procedures for non-hot-plug devices:

1. Press the Power On/Standby switch to Standby. This action places the server in Standby mode, thereby disabling the main power supply output and providing auxiliary power (+5V) to the server. Standby does not disable main input power.

2. Verify that the system LED indicator ❶ on the front panel, near the Power On/Standby switch, is off and that the fan noise stops.

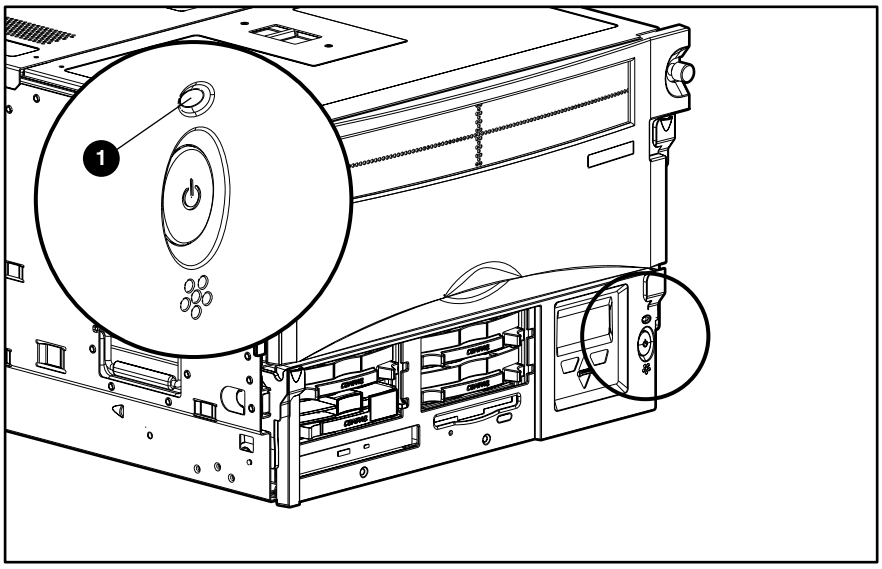

Figure 2-1. System LED indicator

3. Disconnect all power cords from the server to disable all power to the server.

4. For some removal and replacement procedures, you must remove the server from the rack and place it on a sturdy table or workbench. Refer to the *Compaq ProLiant DL760 Servers User Guide* for further instructions.

Weight Warning

42-62 kg
93-137 lb

WARNING: The Compaq ProLiant DL760 weighs 62 kilograms (137 pounds) when fully assembled. To reduce the risk of personal injury or damage to the equipment:

- Observe local health and safety requirements and guidelines for manual material handling.
- Obtain adequate assistance to lift and stabilize the product during installation or removal.
- Remove all pluggable modules and power supplies to reduce the overall weight of the product.

Rack Warnings

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizers are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple-rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

Server Warnings and Precautions

WARNING: To reduce the risk of personal injury from electric shock and hazardous energy levels, only authorized service technicians should attempt to repair this equipment. Improper repairs could create conditions that are hazardous. .

WARNING: To reduce the risk of personal injury from hazardous energy or damage to the equipment when working on energized servers:

- Remove all watches, rings, and any other loose-fitting jewelry.
- Do not use conductive tools inside the server that could bridge live parts.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded electrical outlet that is easily accessible at all times.
- Install the power supply before connecting the power cord to the power supply.
- Unplug the power cord before removing the power supply from the server.
- If the system has multiple power supplies, disconnect power from the system by unplugging all power cords from the power supplies.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

CAUTION: Because the Compaq ProLiant DL760 server does not have safety interlocks, it is possible for a unit to be operated without the cover and air baffles properly installed. This could cause thermal damage in the system and may void your warranty. The rack-mountable Compaq ProLiant DL760 server should always be operated with the system unit cover on. Proper cooling will not be achieved if the system unit cover is removed for extended periods of time.

CAUTION: Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply (UPS). This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

IMPORTANT: The installation of options and servicing of this product shall only be performed by individuals who are knowledgeable of the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

Compaq ProLiant DL760 Server

In Compaq ProLiant DL760 servers, options and accessories are easily accessed through a sliding top access panel and three removable modules: the Processor and Memory Module, the media module, and the I/O module. See Figure 2-2, Figure 2-3, Table 2-1 and Table 2-2 for identification of these modules and other components.

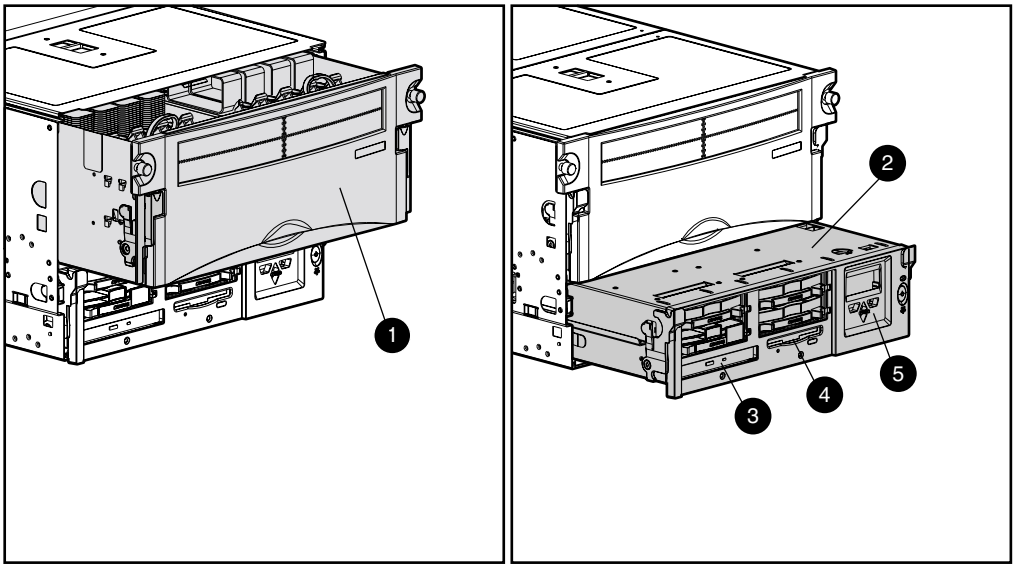

Figure 2-2. Compaq ProLiant DL760 server—front view

Table 2-1
Front Components

Item	Description
❶	Processor and Memory Module
❷	Media module
❸	24X Max IDE CD-ROM drive
❹	1.44-MB diskette drive
❺	Integrated Management Display (IMD)

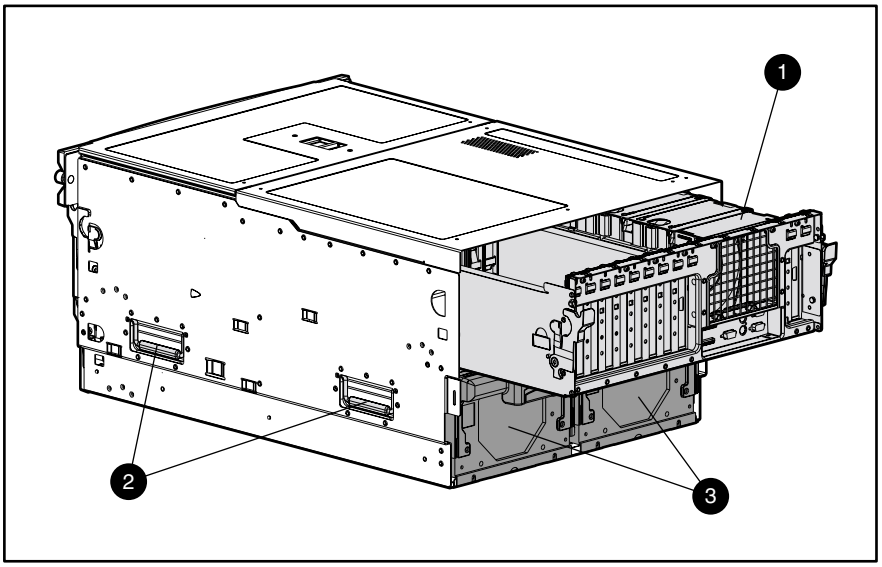

Figure 2-3. Compaq ProLiant DL760 server—rear view

Table 2-2
Rear Components

Item	Description
❶	I/O module with system fans
❷	Integrated server lift handles
❸	Hot-plug power supplies

Server Modules

The Compaq ProLiant DL760 server chassis facilitates the replacement or installation of hardware using three removable modules and a sliding top access panel. Table 2-3 describes the contents of the modules and how to access the components.

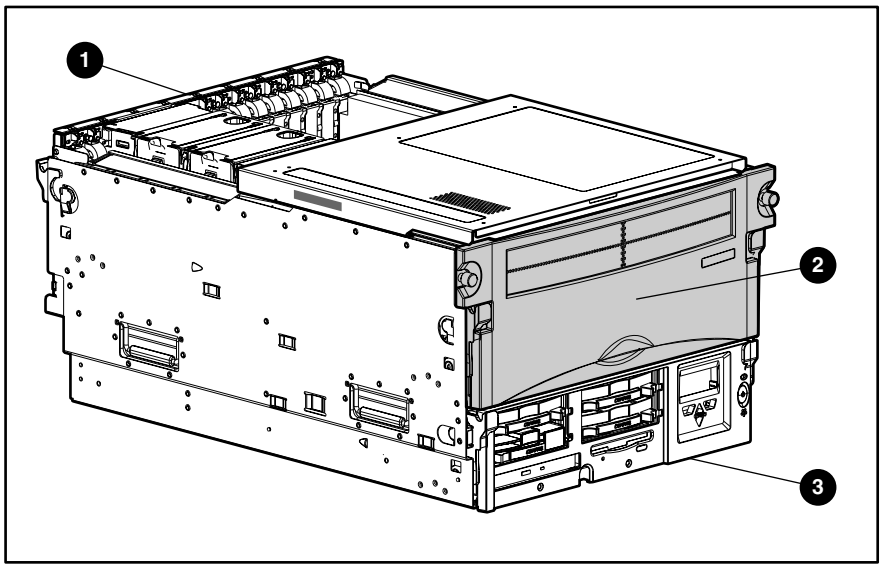

Figure 2-4. ProLiant DL760 server modules

Table 2-3
Module Components and Access

Module	Contents	To Access
❶ I/O module	PCI Hot Plug expansion slots	Slide top access panel toward the front of the server. Lift up the air baffle.
	Configuration switches	Slide top access panel toward the front of the server
	Fans 1 and 2	Slide top access panel toward the front of the server.
❷ Processor and Memory Module	Processor sockets	Remove Processor and Memory Module.
	Processor bus/core ratio switches	Remove Processor and Memory Module
	Cache Accelerator	Remove Processor and Memory Module
	Memory (DIMMs)	Open Processor and Memory Module. Remove memory board.
❸ Media module	CD-ROM/Diskette/IMD	Remove media module
	Hot-plug hard drives	Access directly at front of server

Top Access Panel

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

CAUTION: When the server is powered on, the access panel must be installed for proper system cooling. Otherwise, component stress and permanent equipment damage may result.

Open the top access panel to access the PCI Hot Plug expansion slots, system fans, and configuration switches.

To open the top access panel:

1. Unlock the top latch security screw ❶ and then pull the latch forward ❷.
2. Slide the top access panel toward the front of the server ❸.

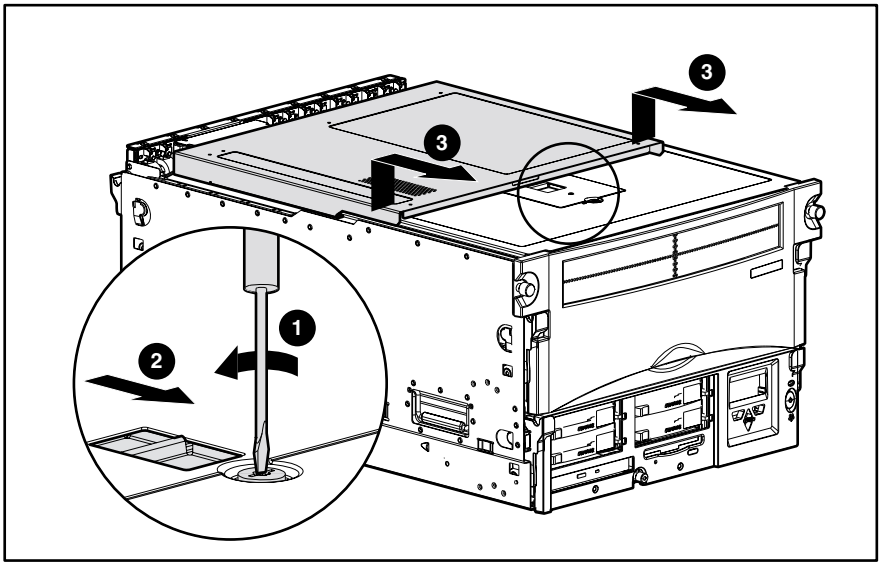

Figure 2-5. Opening the top access panel

NOTE: Compaq recommends leaving the top access panel locked during normal use.

Media Module

Mass storage in Compaq ProLiant DL760 servers is located in the media module. The media module is capable of configuring a maximum of four 1-inch hot-plug Wide Ultra2 or Wide Ultra3 SCSI hard drives. The media module supports two non-hot-plug media drive bays:

- One third-height drive bay occupied by a 1.44-MB diskette drive
- One third-height drive bay occupied by a 24X Max (or higher) IDE CD-ROM drive

Removing the Media Module

CAUTION: Removable media blank bezels and hot-plug drive cage blanking panels must be installed over unused mass storage and removable media device bays to maintain proper airflow.

To remove the media module from the server:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Push in the sides of the cam levers on the media module ❶ and rotate the top of the levers downward ❷.

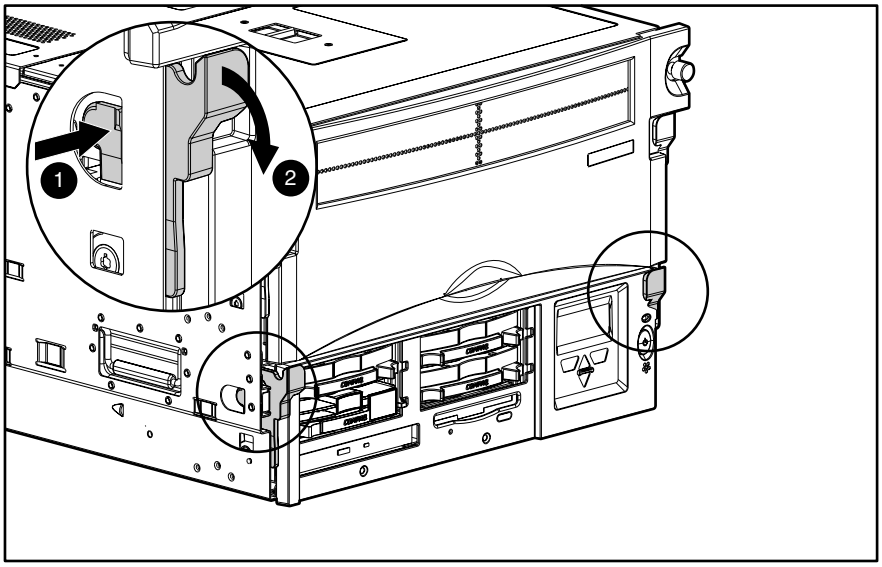

Figure 2-6. Removing the media module

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

3. Pull the media module out of the chassis until it contacts the module stop latch ❸.
4. Press in the module stop latches, then pull the module out of the chassis ❹.

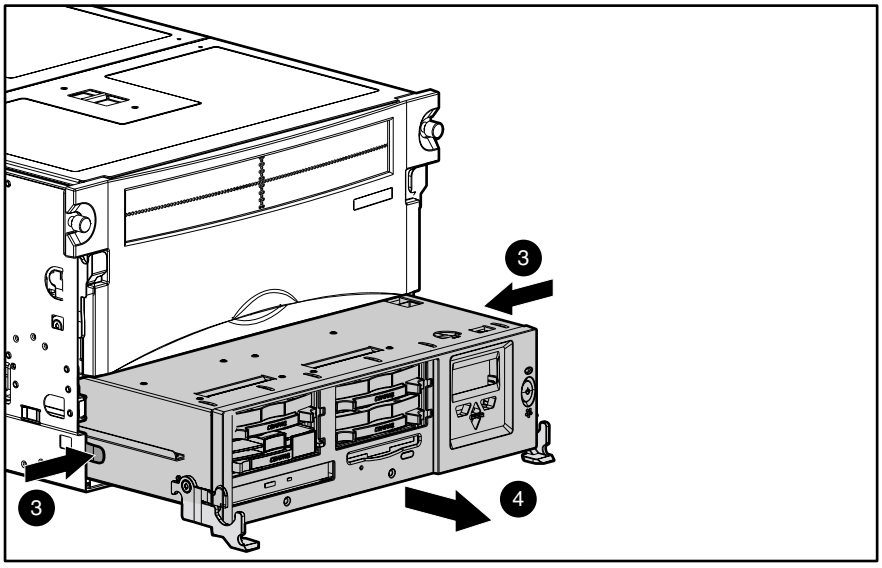

Figure 2-7. Media module opened to stops

Reverse steps 2 through 4 to reinstall the module.

IMPORTANT: Check the System Interconnect Status Indicator LEDs to ensure that the module is properly seated. See Chapter 4, "Connectors, Switches, and LED Indicators."

Media Module Bezel

To remove the media module bezel:

1. Perform the preparation procedures. See “Preparation Procedures” earlier in this chapter.
2. Remove the four screws securing the bezel to the module.
3. Lift up and pull the bezel away from the chassis.

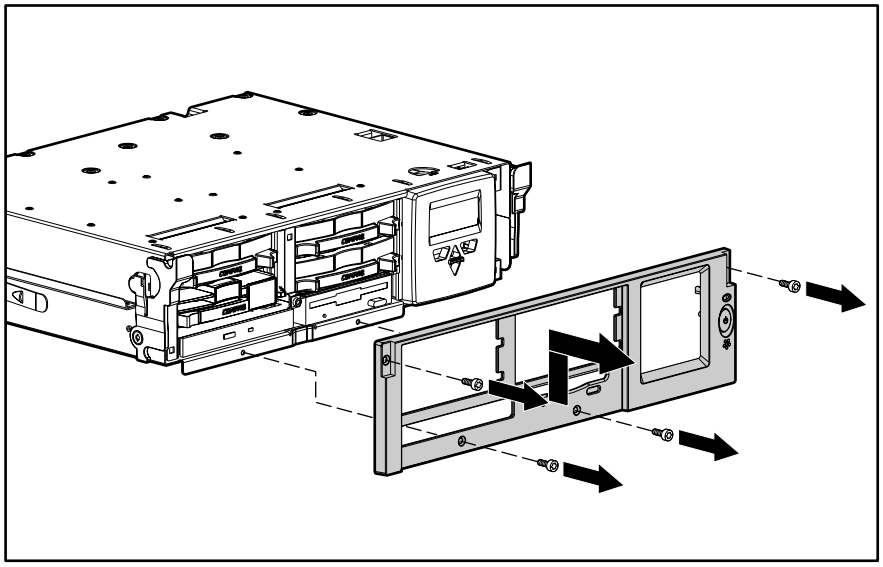

Figure 2-8. Removing the bezel from the media module

Reverse steps 1 through 3 to replace the media module bezel.

Integrated Management Display

To remove the Integrated Management Display (IMD):

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Remove the bezel. See "Media Module Bezel" earlier in this chapter.
3. Remove the media module. See "Removing the Media Module" earlier in this chapter.
4. Disconnect the IMD cable from the media backplane board ❶. See "Media Module Cable Routing Diagram."

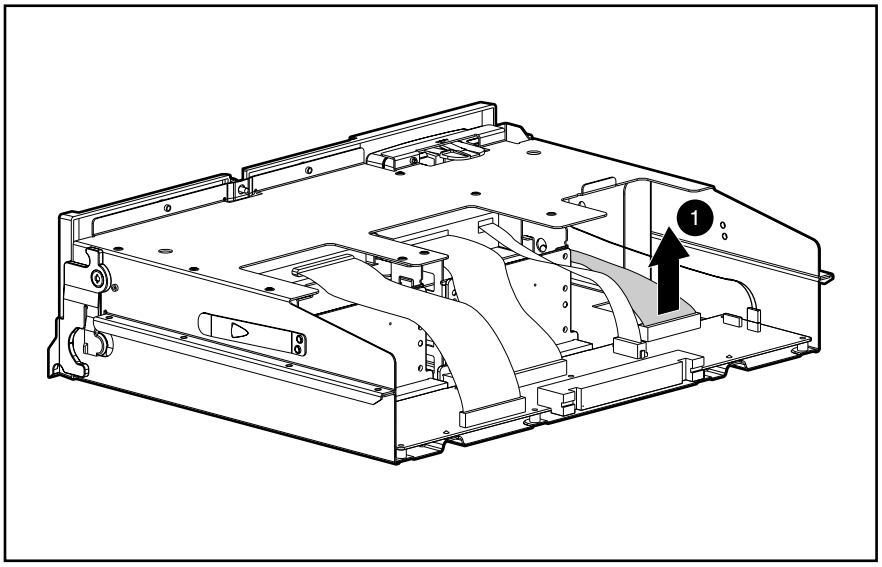

Figure 2-9. Removing the IMD cable

5. Press inward on the two locking tabs on the rear of the display panel ❷.
6. Pull the IMD from the front of the server ❸.

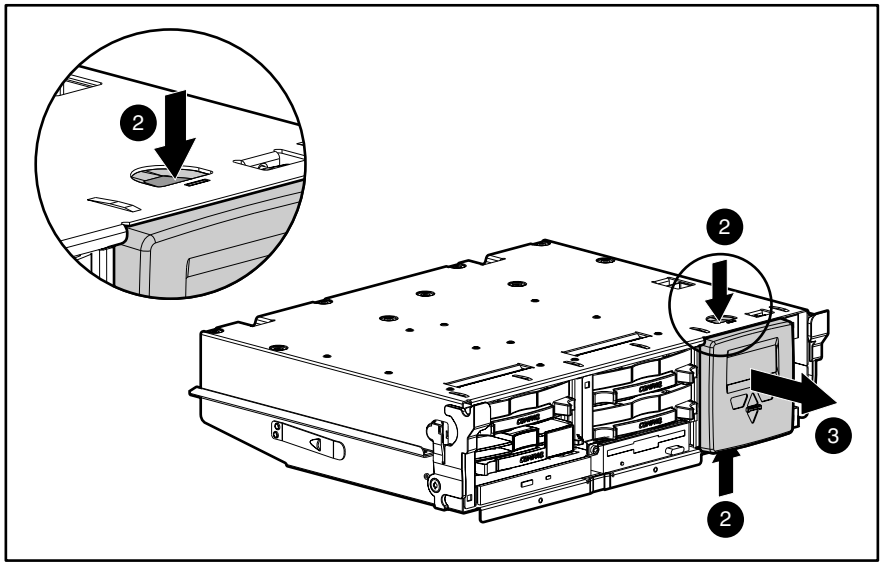

Figure 2-10. Removing the IMD

Reverse steps 1 through 6 to replace the IMD.

Hard Drive Blank

To remove a hard drive blank from a hard drive bay:

1. Push the side of the retaining clip inward ❶.
2. Pull the hard drive blank from the bay ❷.

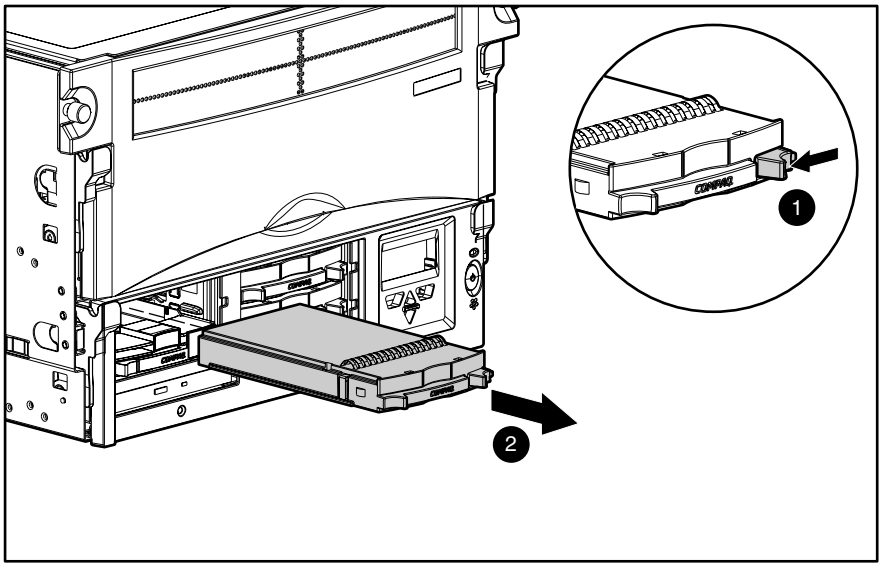

Figure 2-11. Removing a hard drive blank

Reverse steps 1 and 2 to replace a hard drive blank.

Hot-Plug Drive Replacement Guidelines

You should be able to hot-plug a drive during normal activity. Be aware, however, that hot-plugging a disk drive will affect system performance and fault tolerance.

NOTE: Depending on your configuration, a drive failure and the subsequent rebuild process will cause storage subsystem performance degradation. For example, the replacement of a single drive on an array with 50 logical drives will have less impact than if the array has only three logical drives.

Although the system is operational, the disk subsystem may no longer be fault tolerant when a disk drive is hot-plugged.

CAUTION: Fault tolerance will be lost until the removed drive is replaced and the rebuild operation is completed (this will take several hours, even if the system is not busy while the rebuild is in progress). If another drive in the array incurs an error during the period when fault tolerance is unavailable, a fatal system error could result. If another drive fails during this period, the entire contents of the array will be lost.

IMPORTANT: Perform a disk drive replacement during low activity periods whenever possible. In addition, have a current valid backup available for the logical drives in the array of the drive being replaced, even if drive replacement is being made during server downtime.

Hot-Plug Drive Replacement Precautions

Be aware of the following Compaq guidelines for safe hot-plug replacement:

- Do not remove a degraded drive if any other member of the array is offline (the online LED is off). No other drive in the array can be hot-plugged without data loss, unless RAID 0+1 is used as a fault tolerant form. In this case, drives are mirrored in pairs. More than one drive can fail and be replaced as long as the drive or drives they are mirroring are online.

  Refer to your Smart Array Controller user guide for information on fault tolerance options.

- Do not remove a degraded drive if any member of an array is missing (previously removed and not yet replaced).

- Do not remove a degraded drive if any member of an array is being rebuilt, unless the drive being rebuilt has been configured as an online spare. The online LED for the drive being rebuilt will flash, indicating that a replaced drive is being rebuilt from data stored on the other drives.

  NOTE: An online spare will not activate and start rebuilding after a predictive failure alert because the degraded drive is still online. The online spare activates only after a drive in the array has failed.

- Do not replace multiple degraded drives at the same time (for example, when the system is off), or the fault tolerance may be compromised. When a drive is replaced, the controller uses data from the other drives in the array to reconstruct data on the replacement drive. If more than one drive is removed, a complete data set is not available to reconstruct data on the replacement drive or drives, and permanent data loss could occur.

CAUTION: Do not turn off an attached disk drive enclosure when the server containing the Smart Array Controller is powered on. Also, do not turn on the server before turning on the disk enclosure. If these ordering rules are not followed, the Smart Array Controller may mark the drives in this enclosure as "failed," which could result in permanent data loss.

CAUTION: Replace a hot-plug SCSI hard drive only when the drive LED is amber. Do not remove a hot-plug SCSI hard drive if the online LED is green.

To remove a hot-plug SCSI hard drive:

1. Push the tab to unlock the drive ❶.
2. Rotate the hot-plug drive ejector lever outward ❷.
3. Pull the hot-plug drive from the drive bay ❸.

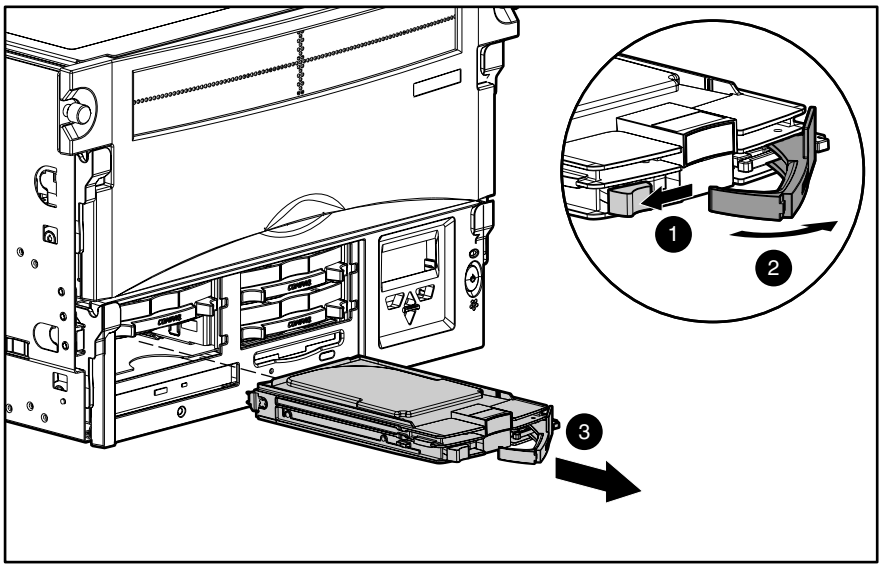

Figure 2-12. Removing a hot-plug SCSI hard drive

Reverse steps 1 through 3 to replace a hot-plug SCSI hard drive.

Integrated Diskette Drive and CD-ROM

The media module has a one third-height drive bay occupied by a 1.44-MB diskette drive and 24X Max (or higher) IDE CD-ROM drive. To remove the integrated diskette drive and CD-ROM drive:

1. Turn the media module over and disconnect the CD-ROM drive signal cable ❶, the diskette drive control and data cable ❷, and diskette drive power cable ❸ from the back of the drives.

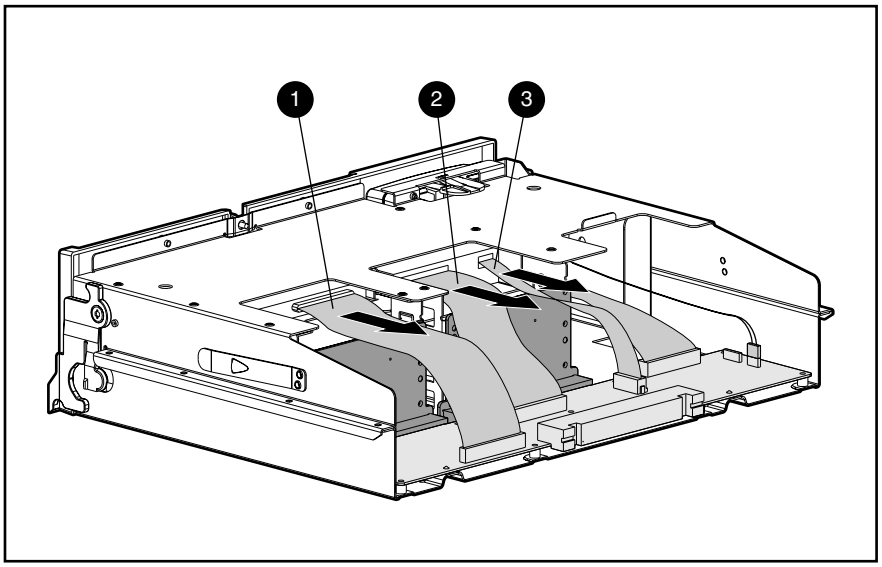

Figure 2-13. Disconnecting the CD-ROM/diskette drive cables

2. Unscrew the tray screw located on the front of the media module.
3. Slide out the diskette drive/CD-ROM tray.

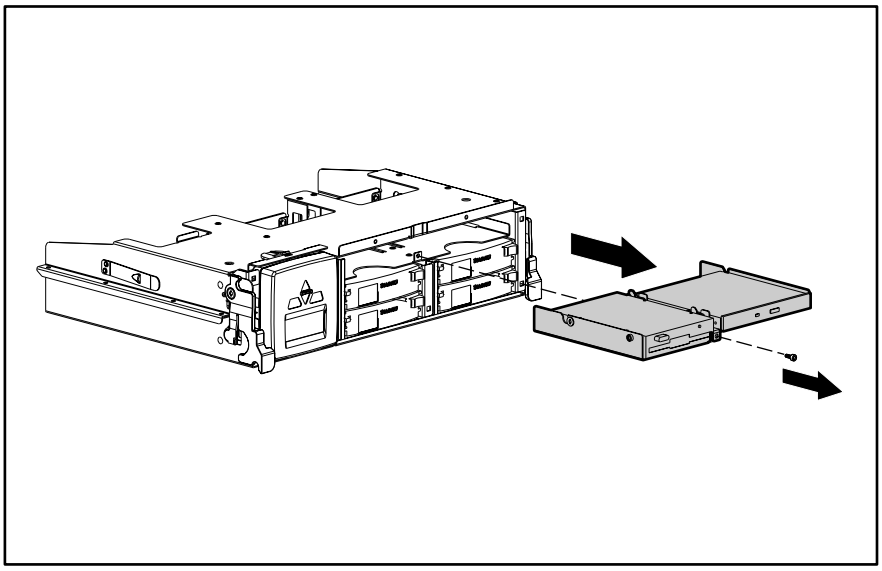

Figure 2-14. Removing the integrated diskette drive and CD-ROM drive

Reverse steps 1 through 3 to replace the integrated diskette drive and CD-ROM drive.

Media Module Cable Routing Diagram

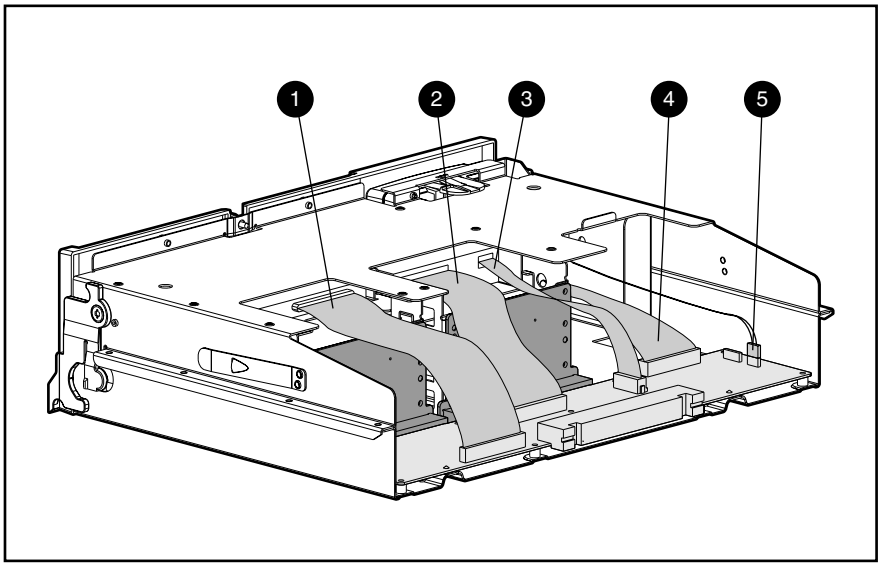

Figure 2-15. Media module cable routing diagram

Table 2-4
Media Module Cable Routing

Item	Description
❶	CD-ROM drive signal cable
❷	Diskette drive control and data cable
❸	Diskette drive power cable
❹	IMD cable
❺	Power switch/LED/ambient air temperature sensor cable

Power On/Standby Switch Assembly

To remove the Power On/Standby switch:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Remove the media module bezel. See "Media Module Bezel" earlier in this chapter.
3. Remove the media module. See "Removing the Media Module" earlier in this chapter.
4. Unplug the IMD cable from the media backplane board. See "Media Module Cable Routing Diagram" earlier in this chapter.
5. Remove the IMD. See "Integrated Management Display" earlier in this chapter.
6. Disconnect the Power On/Standby switch connector from the media backplane board ❶. See "Media Module Cable Routing Diagram" earlier in this chapter.
7. Loosen the thumbscrew that secures the power switch plate to the media backplane board ❷.

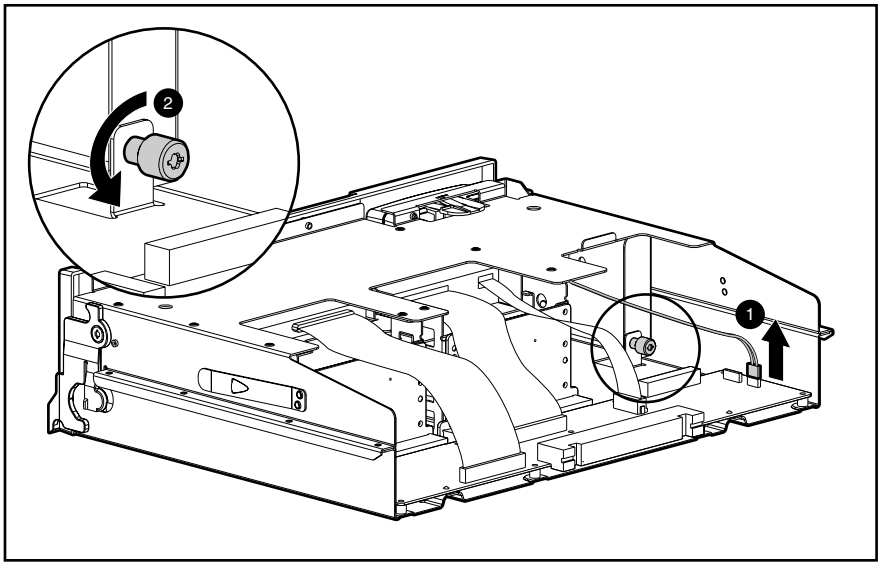

Figure 2-16. Unplugging the power switch cable and loosening the thumbscrew

8. Remove the power switch plate from the media module ❸.

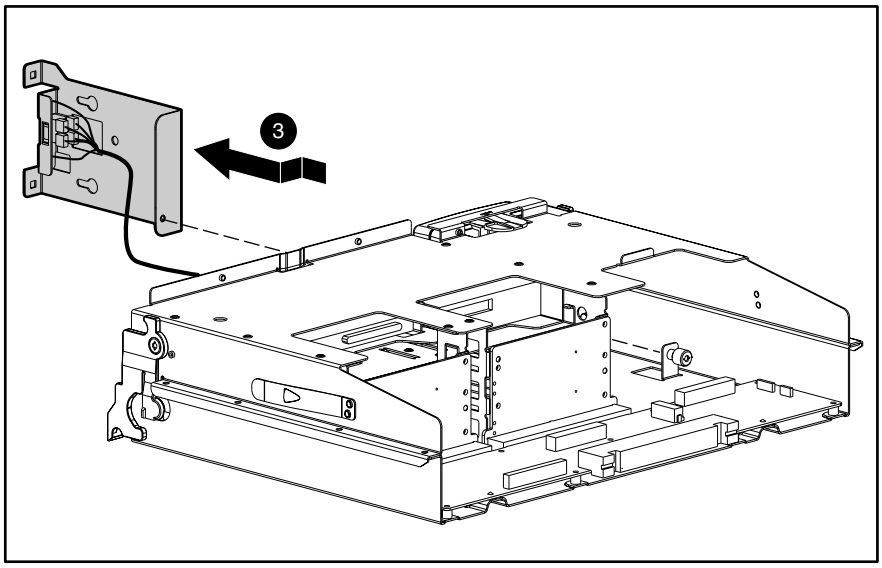

Figure 2-17. Removing the power switch plate from the media module

9. Squeeze the grommets around the LEDs, and remove the LEDs from the grommets. Remove the thermistor from the bracket assembly ❹.

10. Pull the switch assembly out of the power switch plate ❺.

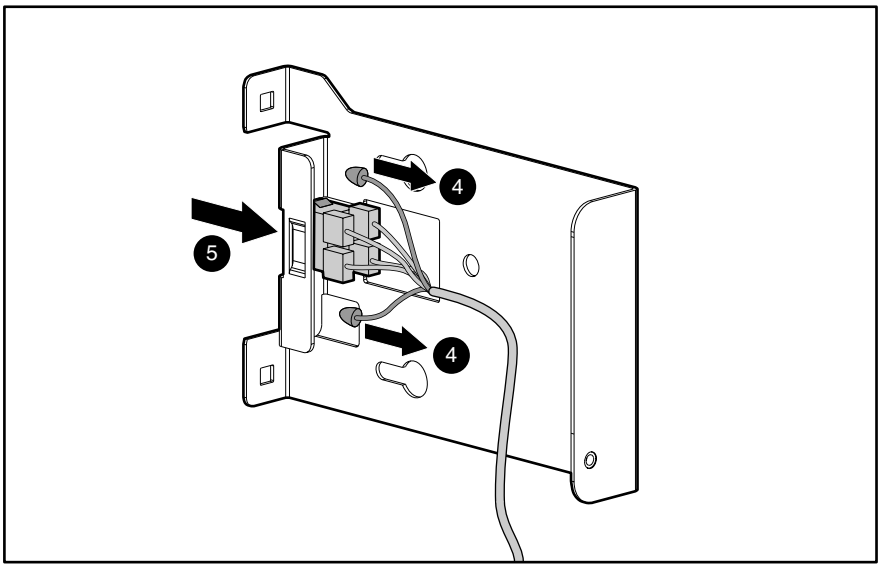

Figure 2-18. Removing the Power On/Standby switch from the power switch plate

Reverse steps 1 through 8 to replace the Power On/Standby switch assembly.

NOTE: The Power On/Standby switch LED is in the top position, and the thermistor is in the bottom position.

Processor and Memory Module

Shipping Screw

To protect the Processor and Memory Module during shipping, a bracket with a shipping screw is installed. To loosen the shipping screw:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Open the top access panel. See "Top Access Panel" earlier in this chapter.
3. Lift the fan intake plenum ❶.
4. Loosen the thumbscrew ❷.

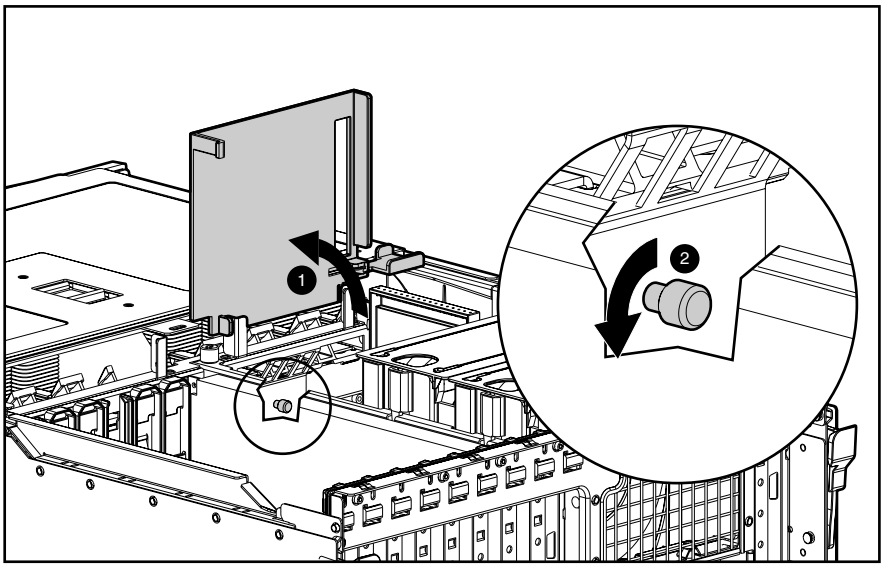

Figure 2-19. Loosening the shipping screw

Opening and Removing the Processor and Memory Module

To open the Processor and Memory Module:

1. Perform the preparation procedures. See “Preparation Procedures” earlier in this chapter.
2. Push in the sides of the cam levers on the Processor and Memory Module ❶, and rotate the top of the levers downward ❷.

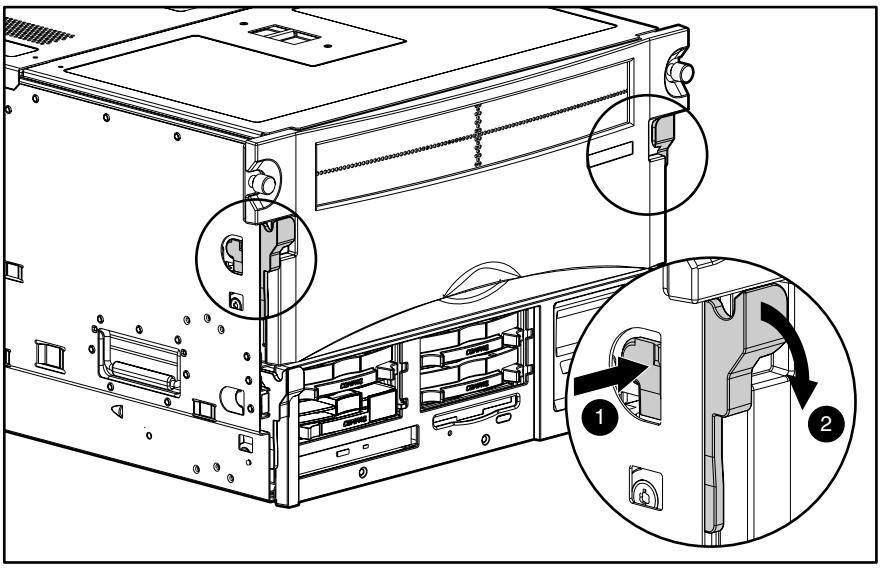

Figure 2-20. Opening the Processor and Memory Module

3. Pull the Processor and Memory Module out of the chassis until it contacts the module stop latches ❸.
4. Push the module stop latches inward, and slide the Processor and Memory Module out of the chassis ❹.

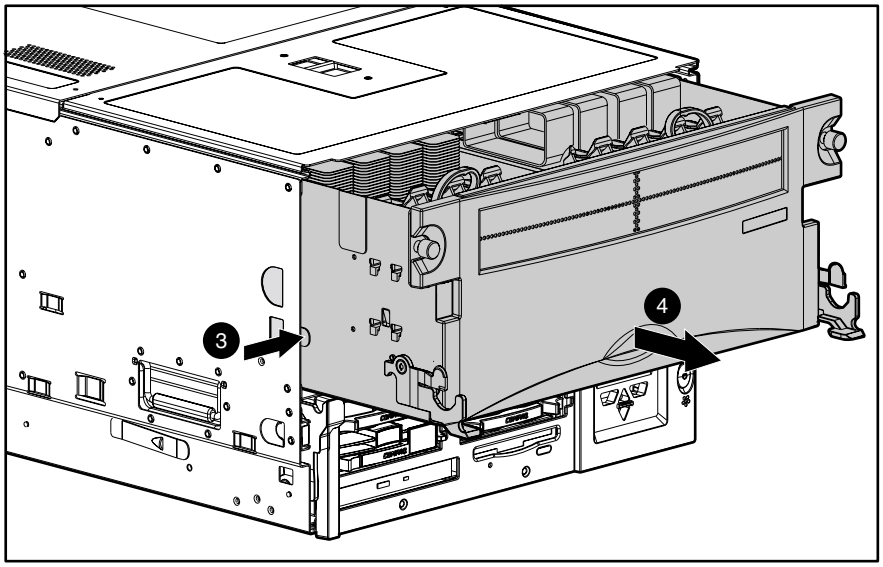

Figure 2-21. Removing the Processor and Memory Module

Reverse steps 1 through 4 to reinstall and close the Processor and Memory Module.

Removing the Memory Board

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

To remove a memory board:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Open the Processor and Memory Module. See "Opening and Removing the Processor and Memory Module" earlier in this chapter.
3. Rotate the memory board ejectors outward ❶, and then remove the memory board from the processor board ❷.
4. Place the memory expansion board, components facing up, on a flat surface.

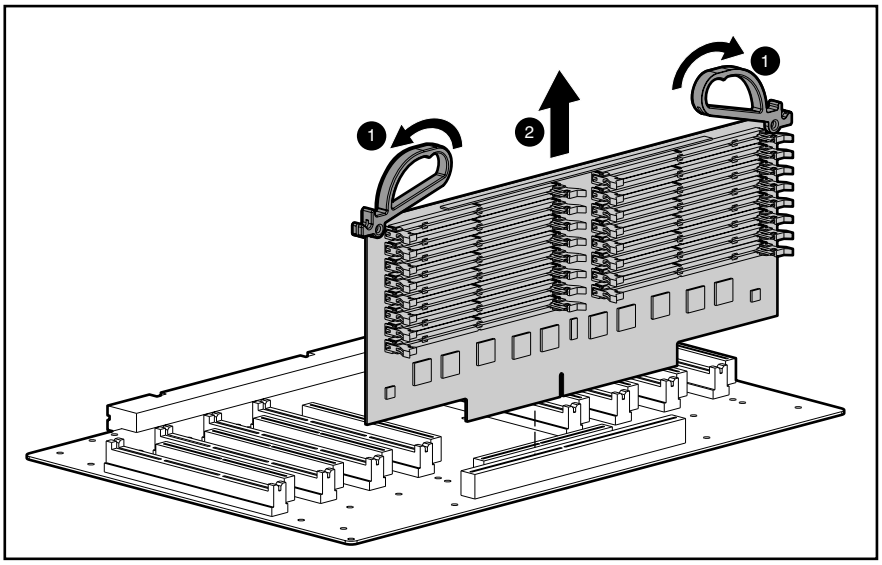

Figure 2-22. Removing the memory board

IMPORTANT: The memory board is part of the system interconnect scheme and must be seated properly for server startup.

Reverse steps 1 through 4 to replace the memory board.

Dual Inline Memory Modules

Compaq ProLiant DL760 servers ship with 128-MB, 256-MB, 512-MB, or 1-GB Synchronous DRAM (SDRAM) Dual Inline Memory Modules (DIMMs) installed. Memory can be expanded to a maximum of 16 GB. Install SDRAM DIMM module pairs, one module at a time, into the proper sockets.

CAUTION: Compaq recommends using only Compaq SDRAM DIMMs. DIMMs from other sources may adversely affect data integrity.

Adhere to the following guidelines when installing or replacing memory:

- DIMMs must be installed in pairs.
- Use only 128-MB, 256-MB, 512-MB, or 1-GB SDRAM DIMMs.
- Both DIMMs of a given bank must be the same size, type, and speed.

The recommended SDRAM DIMM installation order is to begin with Bank 1, DIMMs 1 and 2, and then populate toward Bank 8.

Figure 2-23 shows DIMM memory bank locations 1 through 8 and DIMMs 1 through 16 on the memory expansion board in Compaq ProLiant DL760 servers.

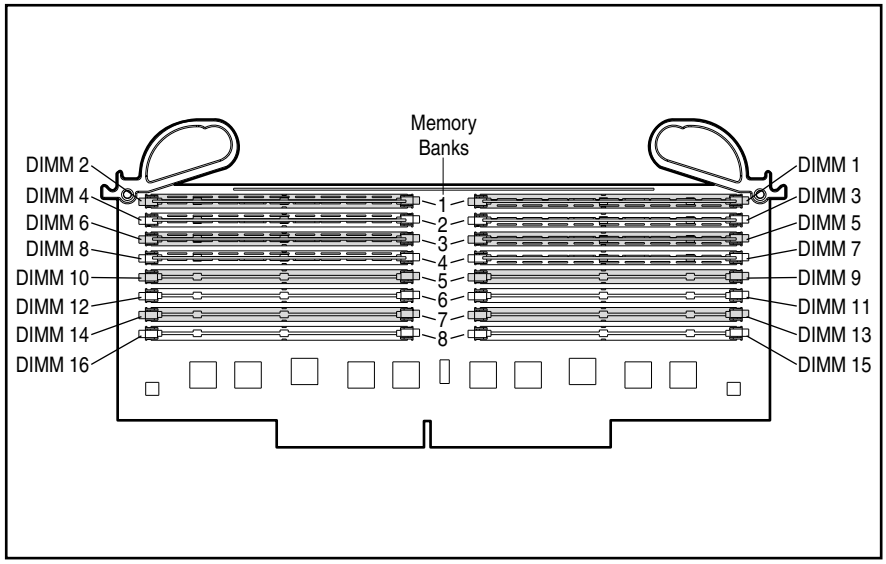

Figure 2-23. Locating DIMM sockets on memory banks 1 through 8

Any combination of SDRAM DIMMs can be used as long as the guidelines explained earlier are followed. Examples of possible SDRAM DIMM upgrade combinations for each memory board are shown in Table 2-5.

Table 2-5
Examples of SDRAM DIMM Upgrade Combinations

Total Memory	Bank 1	Bank 2	Bank 3	Bank 4	Bank 5	Bank 6	Bank 7	Bank 8
256 MB	2 x 128 MB							
512 MB	2 x 128 MB	2 x 128 MB						
1 GB	2 x 128 MB	2 x 128 MB	2 x 128 MB	2 x 128 MB				
1.5 GB	2 x 128 MB	2 x 128 MB	2 x 128 MB	2 x 128 MB	2 x 128 MB	2 x 128 MB		
2 GB	2 x 256 MB	2 x 256 MB	2 x 256 MB	2 x 256 MB				
4 GB	2 x 256 MB	2 x 256 MB	2 x 256 MB	2 x 256 MB	2 x 256 MB	2 x 256 MB	2 x 256 MB	2 x 256 MB
4 GB	2 x 512 MB	2 x 512 MB	2 x 512 MB	2 x 512 MB				
6 GB	2 x 512 MB	2 x 512 MB	2 x 512 MB	2 x 512 MB	2 x 512 MB	2 x 512 MB		
8 GB	2 x 512 MB	2 x 512 MB	2 x 512 MB	2 x 512 MB	2 x 512 MB	2 x 512 MB	2 x 512 MB	2 x 512 MB
16 GB	2 x 1 GB	2 x 1 GB	2 x 1 GB	2 x 1 GB	2 x 1 GB	2 x 1 GB	2 x 1 GB	2 x 1 GB

To remove a DIMM:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Remove the Processor and Memory Module. See "Opening and Removing the Processor and Memory Module" earlier in this chapter.
3. Remove the memory board. See "Removing the Memory Board" earlier in this chapter.
4. Press outward on the socket latches at each end of the DIMM ❶.
5. Remove the DIMM from the memory expansion board ❷.

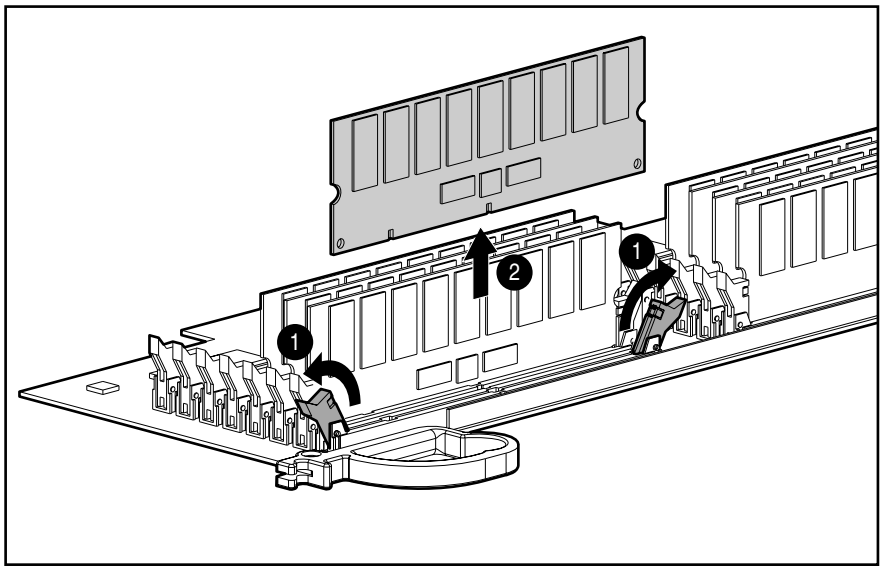

Figure 2-24. Removing a DIMM from the memory board

Reverse steps 1 through 5 to replace a DIMM.

CAUTION: The ejectors prevent the memory expansion board from lying completely flat. Inserting a DIMM without counter pressure applied behind the socket to the back of the expansion board can cause the memory expansion board to flex and could result in damage. Always support the memory expansion board or apply counter pressure while inserting a DIMM.

IMPORTANT: Make sure that both latches are secured when the DIMM is installed.

Processor Board Layout

Figure 2-25 and Table 2-6 show the processor board layout and processor socket numbering.

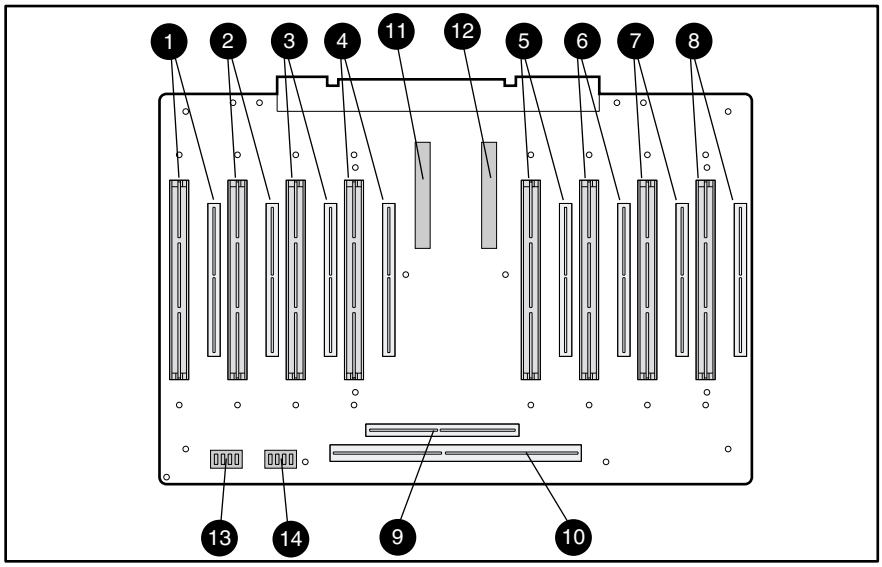

Figure 2-25. Processor board layout

Table 2-6
Processor Board Layout

Item	Description
❶	Processor socket 1 and associated power module socket
❷	Processor socket 2 and associated power module socket
❸	Processor socket 3 and associated power module socket
❹	Processor socket 4 and associated power module socket
❺	Processor socket 5 and associated power module socket
❻	Processor socket 6 and associated power module socket
❼	Processor socket 7 and associated power module socket
❽	Processor socket 8 and associated power module socket
❾	Processor bus termination power module
❿	Memory board socket
⓫	Bus 1 Cache Accelerator socket
⓬	Bus 2 Cache Accelerator socket
⓭	Bus 1 processor/core ratio switch (SW1)
⓮	Bus 2 processor/core ratio switch (SW2)

Processor

CAUTION: Handle the processor only by the ejectors. If you must set the processor down, lay it down on the side with the hologram to prevent damage to the heat pipes and fins.

IMPORTANT: If you remove a processor, a processor terminator board must be reinstalled in the slot before powering up the server.

To remove a processor:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Remove the Processor and Memory Module. See "Opening and Removing the Processor and Memory Module" earlier in this chapter.
3. Rotate the front and rear ejector levers on the processor outward until the processor is disconnected from the connector ❶.
4. Remove the processor by lifting up on the ejectors ❷.

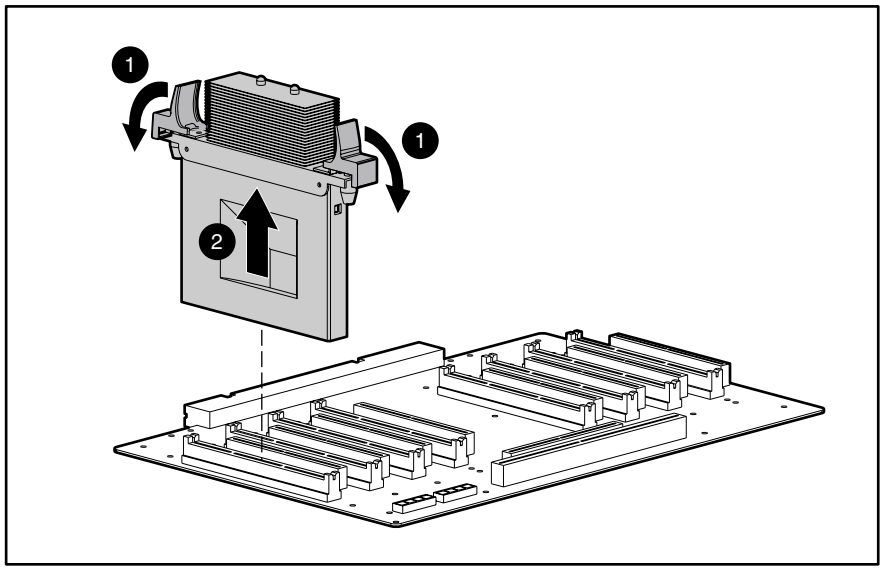

Figure 2-26. Removing a processor

Reverse steps 1 through 4 to replace a processor.

CAUTION: The Processor Power Module must be installed before you install the accompanying processor. Attempting to install the Processor Power Module afterward could damage its electronic components.

CAUTION: The server will not boot if the Intel Pentium III Xeon processors are not the same speed.

IMPORTANT: When installing a processor, push down on both levers simultaneously. The server may not recognize the processor if it is not properly installed.

NOTE: Upon restart, the System ROM will automatically detect the presence of the new processor and clear the POST processor failure message.

Processor Power Module

CAUTION: The processor must be removed before you remove the Processor Power Module. Attempting to remove the Processor Power Module before removing the processor could damage the processor's electronic components.

To remove a Processor Power Module:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Remove the Processor and Memory Module. See "Opening and Removing the Processor and Memory Module" earlier in this chapter.
3. Rotate the ejector levers on the Processor Power Module outward ❶.
4. Remove the Processor Power Module ❷.

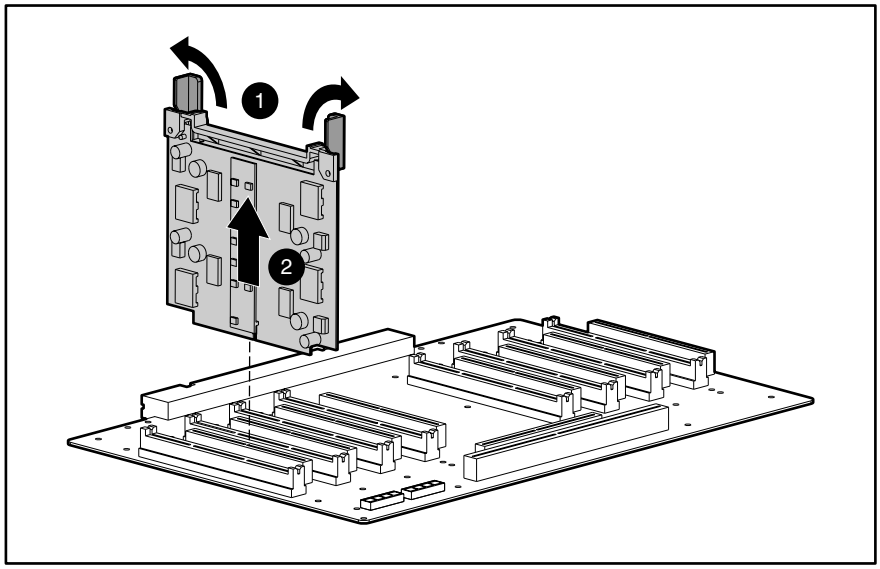

Figure 2-27. Removing a Processor Power Module

Reverse steps 1 through 4 to replace the Processor Power Module.

CAUTION: The Processor Power Module must be installed before you install the accompanying processor. Attempting to install the Processor Power Module afterward could damage its electronic components.

NOTE: The Processor Power Module is keyed for correct alignment.

Processor Terminator Board

To remove a processor terminator board:

1. Rotate the ejector levers on the processor terminator board ❶ outward.
2. Remove the processor terminator board ❷.

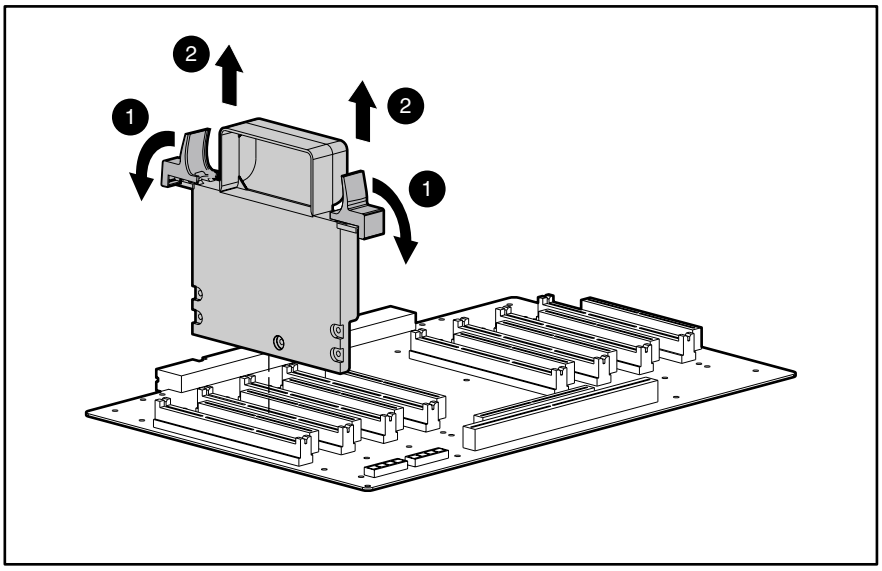

Figure 2-28. Removing a processor terminator board

Reverse steps 1 and 2 to replace a processor terminator board.

Middle Air Baffle

IMPORTANT: The middle air baffle must be installed during operation of the server to ensure proper processor cooling.

To remove the middle air baffle:

1. Loosen the thumbscrew of the middle air baffle ❶.
2. Lift the baffle upward ❷.
3. Remove the middle air baffle ❸.

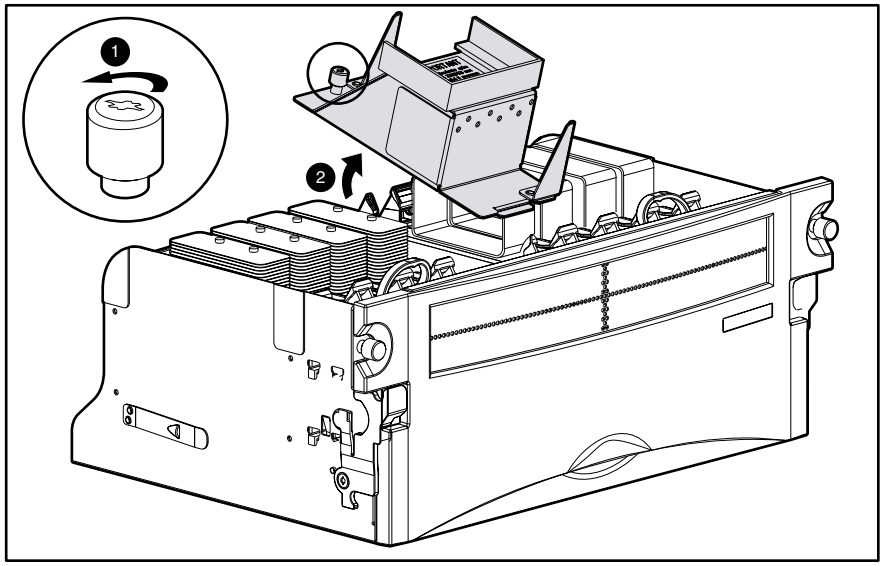

Figure 2-29. Removing the middle air baffle

Reverse steps 1 through 3 to replace the middle air baffle.

Cache Accelerators

IMPORTANT: Cache Accelerators must be installed when processors are installed on both buses.

To remove a Cache Accelerator:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Remove the Processor and Memory Module. See "Opening and Removing the Processor and Memory Module" earlier in this chapter.
3. Loosen the thumbscrew of the middle air baffle and lift the baffle upward to allow access to the Cache Accelerator. See "Middle Air Baffle" earlier in this chapter.
4. Locate the Cache Accelerator.
5. Push down on the release lever on the side of the Cache Accelerator slot ❶.
6. Remove the Cache Accelerator ❷.

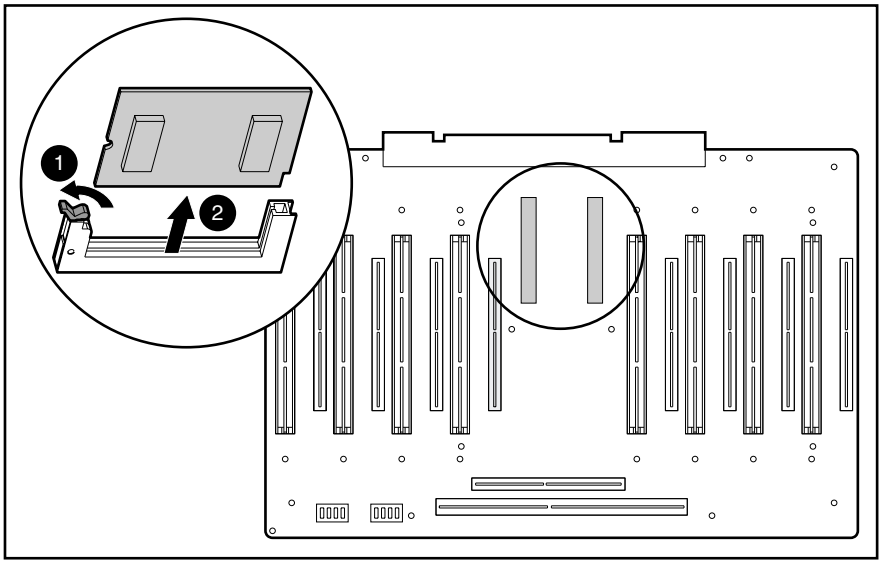

Figure 2-30. Removing a Cache Accelerator

Reverse steps 1 through 6 to replace the Cache Accelerator.

NOTE: Cache Accelerator modules are keyed to ensure correct alignment.

After replacing the Cache Accelerator, complete the following steps to clear the Cache Accelerator POST Error 220:

1. Reboot the server and press the **F9** key to enter the ROM-based Setup Utility.
2. After you are in the utility, select **Advanced Options**.
3. Select **Set Cache Accelerator Corrected**.
4. Select the slot, either 1 or 2, that has been corrected.
5. Press the **ESC** key twice, and then press the **F10** key to save.

The bit in NVRAM is cleared at this point. If the Cache Accelerator replacement has been successful, the POST Error 220 should no longer appear at reboot.

Processor Board

The processor board is located at the bottom of the Processor and Memory Module and should not be removed. If there is a need to replace the processor board, a new processor module with system board must be ordered. The new processor board will be attached to the bottom of the module, along with processor guide rails.

I/O Module

The I/O module is located at the rear of the server. Remove it to replace or service non-hot-plug components or to access other components in the I/O module.

Removing the I/O Module

To remove the I/O module:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter. If the server is rack mounted, the cable management arm must be removed. See the section "Removing the Cable Management Arm" later in this chapter.
2. Label and remove the cables from the back of the I/O module.
3. Open the top access panel. See "Top Access Panel" earlier in this chapter.
4. Loosen the shipping screw, if necessary. See "Shipping Screw" earlier in this chapter.
5. Push in on the sides of the stop latches ❶ on the I/O module, and rotate the cam levers downward ❷.
6. Pull the I/O module out of the chassis ❸ until it catches on the module stop latch.

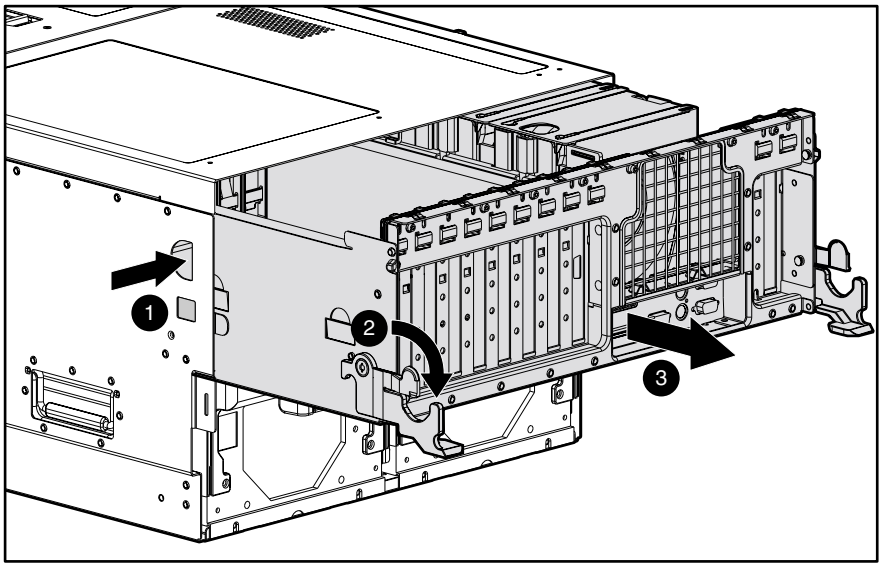

Figure 2-31. Partially removing the I/O module

7. To completely remove the I/O module from the chassis, press in on the module stop latches ❹, and pull the module out of the chassis ❺.

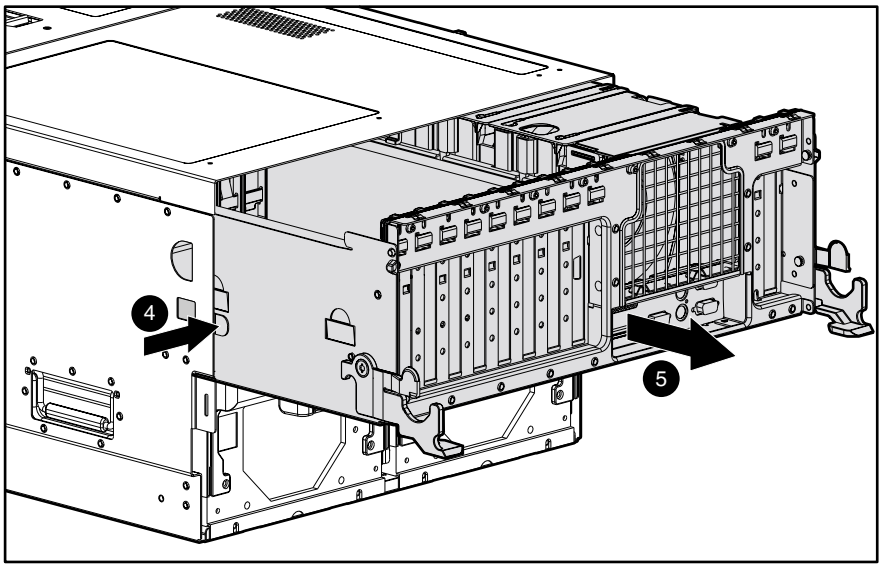

Figure 2-32. Removing the I/O module

Reverse steps 1 through 7 to reinstall the module in the server.

Removing the Cable Management Arm

To remove the cable management arm:

1. Label all cables running through the cable management arm.
2. Disconnect all cables from the rear of the I/O module.
3. Loosen the green thumbscrew that secures the cable management arm and bracket to the I/O module ❶.
4. Move the bracket, with cable management arm attached, slightly up and then back from the server ❷ so that it is possible to access the cam levers on the I/O module.

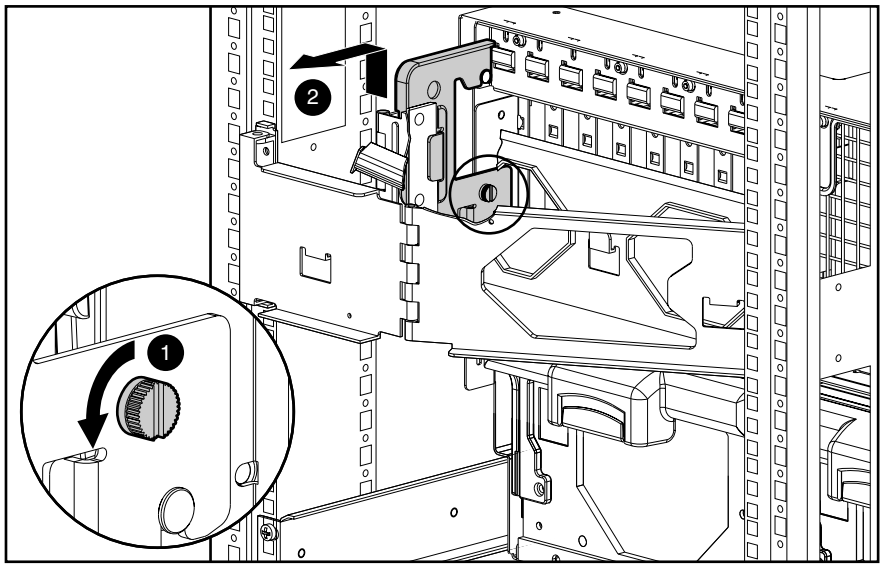

Figure 2-33. Disconnecting the cable management bracket from the I/O module

5. Swing the cable management arm to the left and out of the way ❸.

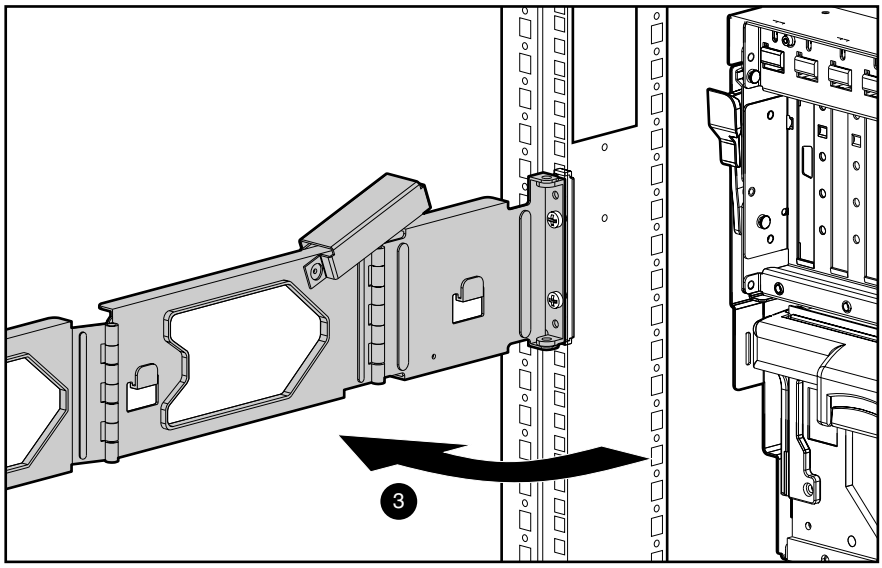

Figure 2-34. Rotating the cable management arm to the left

Locating the I/O Expansion Slots

The I/O expansion slots are located on the I/O board in the I/O module. The I/O board in the Compaq ProLiant DL760 server has 11 slots divided into 3 buses. The Primary bus ❶ (slots 7 through 9) is keyed for 64-bit 5-V PCI boards or 64-bit PCI universal boards. The Secondary bus ❷ (slots 1 through 6) and the Tertiary bus ❸ (slots 10 through 11) are keyed for 64-bit 3.3-V PCI/PCI-X boards or 64-bit universal PCI/PCI-X boards. The PCI/PCI-X expansion slots associated with each of the three buses and the supported speeds are identified in Figure 2-35, Figure 2-36, and Table 2-7. Bus balancing is not required...

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

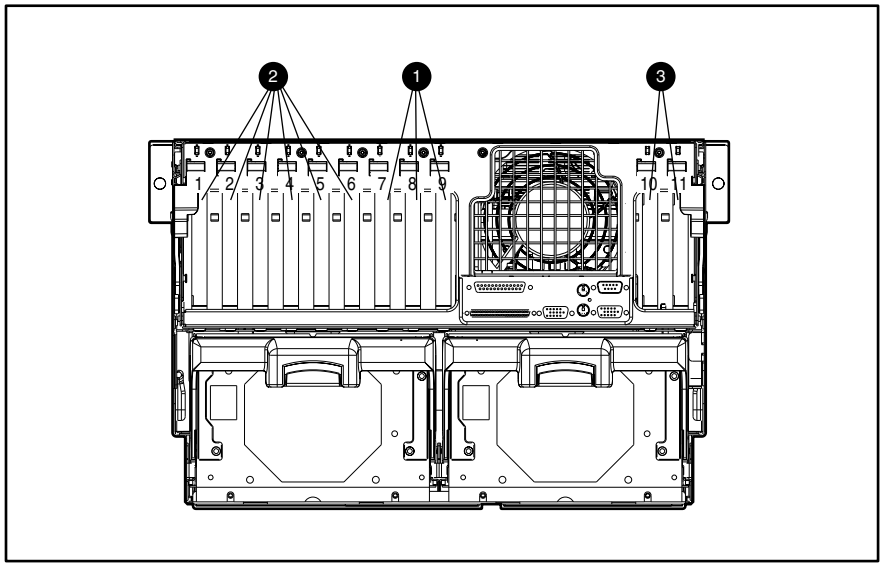

Figure 2-35. Diagram of I/O slot connections from the rear of the server

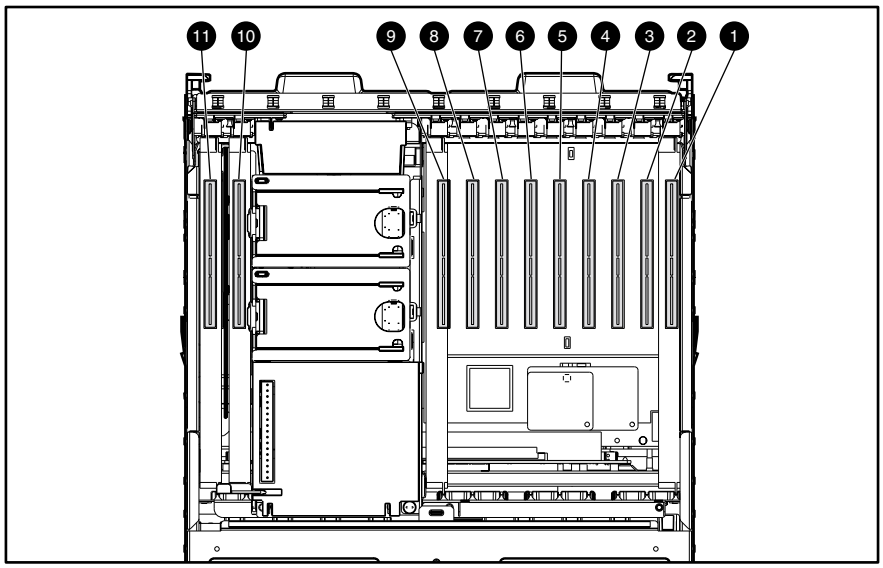

Figure 2-36. Bus distribution of PCI Hot Plug slots

Table 2-7
Bus Distribution of PCI Hot Plug Slots.

Bus	PCI Hot Plug Slot No	Associated PCI Bus and Bus Speed
Primary	Slots ❼ through ❾	PCI Bus 1 (64 Bit), 33-MHz
Secondary	Slots ❶ through ❻	PCI-X Bus 2 (64 Bit), 50-MHz
	Slots ❶ through ❻	PCI Bus 2 (64-Bit), 33-MHz
Tertiary	Slots ❿ and ⓫	PCI-X Bus 3 (64 Bit), 100-MHz
	Slots ❿ and ⓫	PCI Bus 3 (64-Bit), 33-MHz, 66-MHz

Note 1: All PCI-X Buses support PCI expansion boards at 33 MHz.
Note 2: The Bus speed will only run as fast as the slowest board installed.

NOTE: The I/O expansion board slots are numbered from right to left as you face the front of the server.

Removing the I/O Expansion Slot Cover

To remove the I/O expansion slot cover:

1. Press down on the top of the expansion slot release lever ❶ and push the lever up ❷.
2. Remove the expansion slot cover ❸.

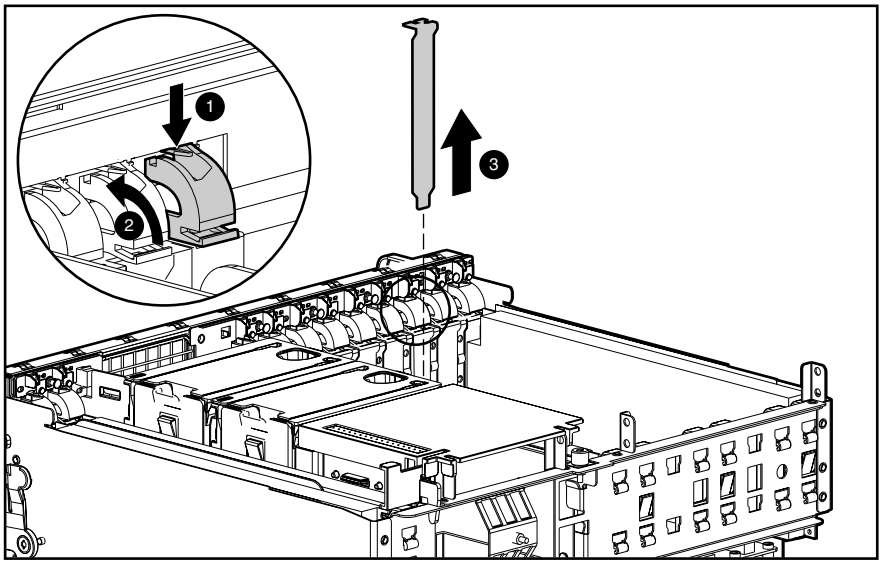

Figure 2-37. Removing the I/O expansion slot cover

Reverse steps 1 and 2 to replace the I/O expansion slot cover.

Removing a PCI/PCI-X Expansion Board

CAUTION: Do not open the slot release lever unless the green PCI Hot Plug LED indicator is off. System power down and subsequent data loss could occur.

To remove a PCI/PCI-X expansion board:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Open the top access panel. See "Top Access Panel" earlier in this chapter.
3. Use the PCI Hot Plug button to turn off power to the slot ❶. The green LED flashes during the power down transition and turns off when the power down is complete. For more information on PCI Hot Plug LED indicators, see Chapter 4, "Connectors, Switches, and LED Indicators."

NOTE: Pressing the PCI Hot Plug button within five seconds of the first press cancels the action.

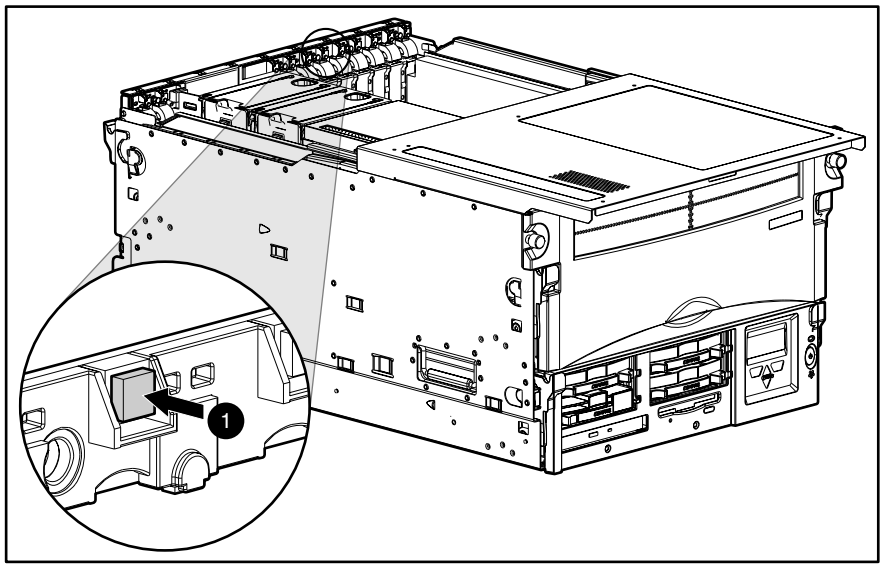

Figure 2-38. Accessing the PCI Hot Plug button

4. When the green LED is off, disconnect the cables to the PCI/PCI-X expansion board.
5. Press down on the top of the expansion slot ❷, and open the slot release lever ❸.
6. Lift up the I/O plenum ❹.
7. Remove the PCI/PCI-X expansion board ❺.
8. Return power to the slot by pressing the PCI Hot Plug button. The green LED will flash during the power up transition and will glow steadily when power up is complete. For more information on PCI Hot Plug LED indicators, see Chapter 4, "Connectors, Switches, and LED Indicators."

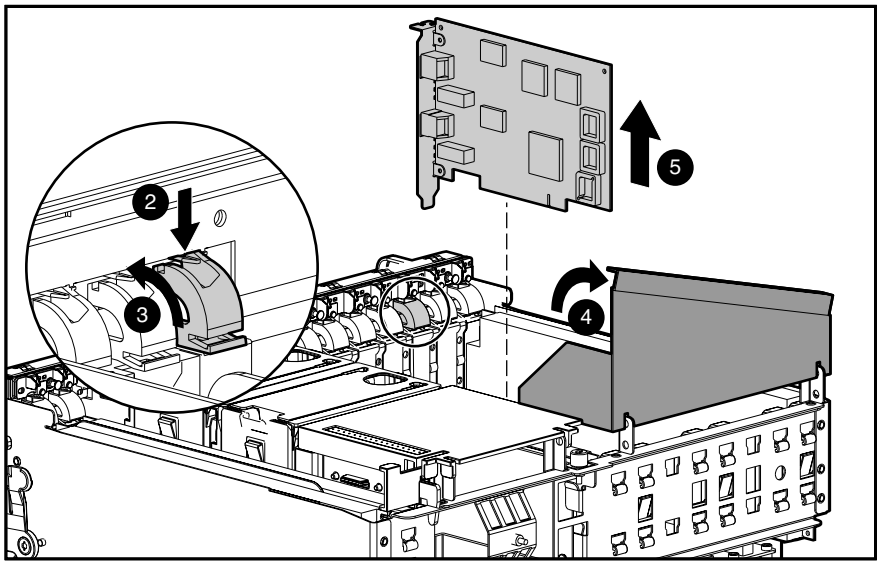

Figure 2-39. Removing a PCI/PCI-X expansion board

Reverse steps 1 through 8 to replace the PCI/PCI-X expansion board.

IMPORTANT: If you are only removing the expansion board, install an expansion slot cover in the slot.

IMPORTANT: Remove any shipping brackets from the replacement expansion board before installation.

9-Slot Hot-Plug Basket

To remove the 9-slot hot-plug basket:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Open the top access panel. See "Top Access Panel" earlier in this chapter.
3. Remove all installed expansion boards in slots 1 through 9. See "Removing a PCI/PCI-X Expansion Board" earlier in this chapter.
4. Flex the snap tab holding the array enabler board ❶ and remove the board ❷.

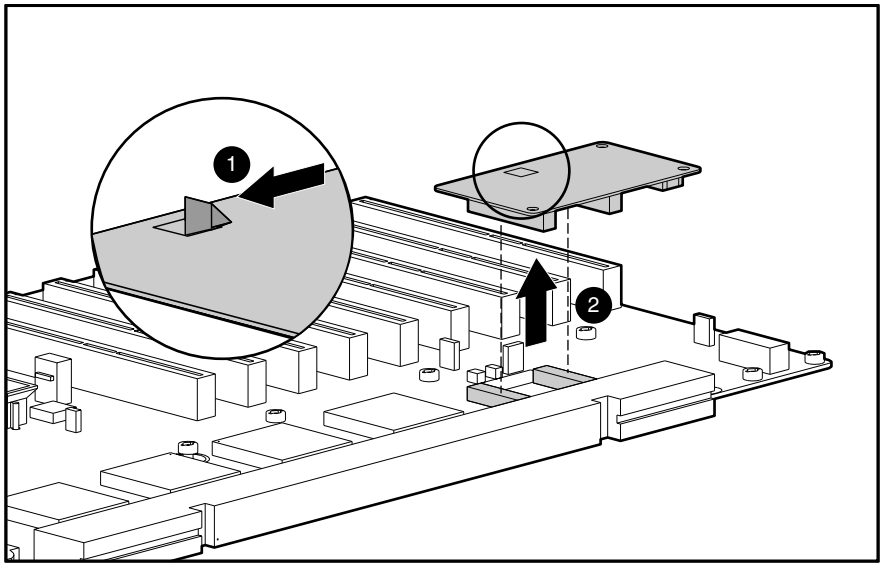

Figure 2-40. Removing the array enabler board

5. Remove the screw ❸ securing the hot-plug basket to the chassis.
6. Disengage the two hot-plug basket tabs ❹ near slot 1 from the I/O module chassis.
7. Remove the hot-plug basket from of the I/O module ❺.

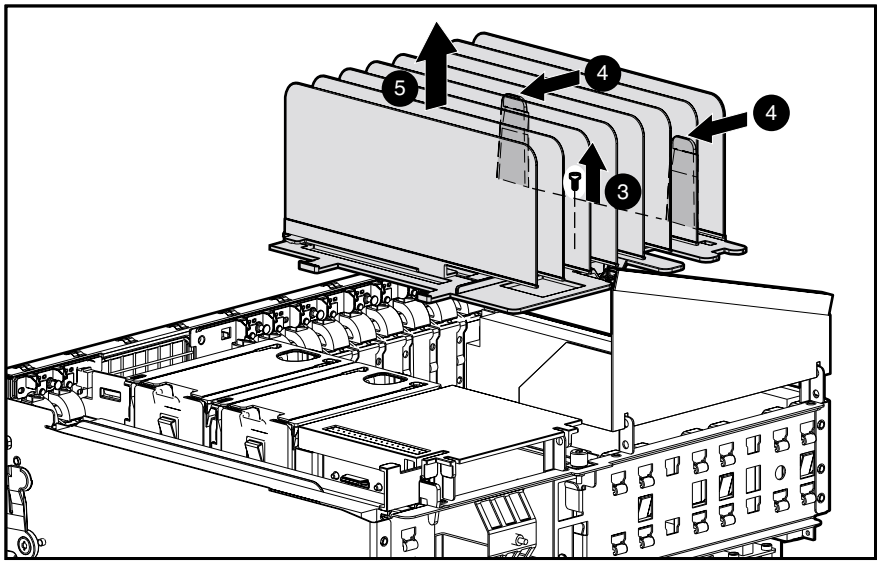

Figure 2-41. Removing the 9-slot hot-plug basket

Reverse steps 1 through 7 to replace the 9-slot hot-plug basket.

Hot-Plug Fans

The Compaq ProLiant DL760 server ships with two hot-plug fans. Fan 1 is closest to the rear of the server. Each fan has LEDs that indicate the status of the fan. For more information on the hot-plug fan LEDs, see Chapter 4, "Connectors, Switches, and LED Indicators."

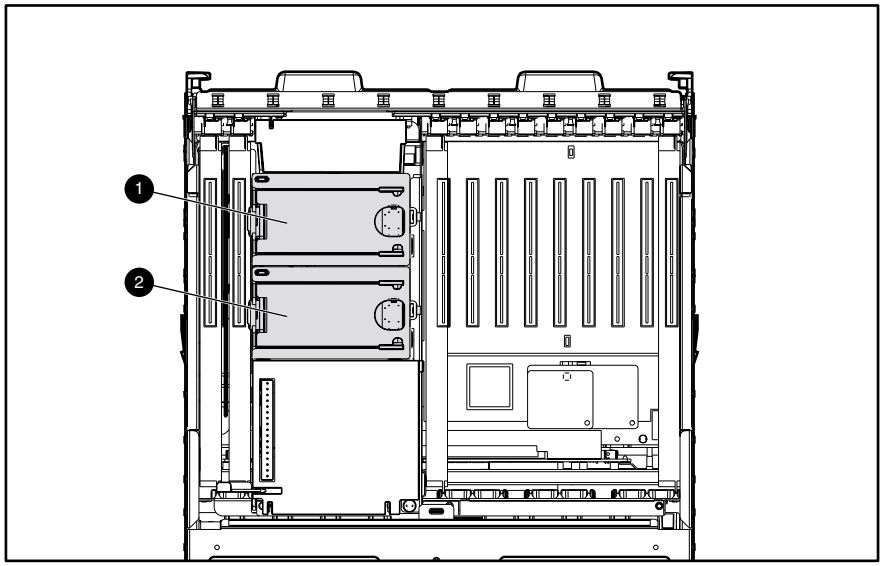

Figure 2-42. Top view of hot-plug fans

Table 2-8
Hot-Plug Fans

Item	Description
❶	Hot-plug fan 1
❷	Hot-plug fan 2

To remove a hot-plug fan from the server:

CAUTION: Never remove both hot-plug fans while the server is powered up. Overheating and damage to hardware could result. If the appropriate Compaq software drivers are installed, the operating system software will initiate a power shutdown in the event of overheating.

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Open the top access panel. See "Top Access Panel" earlier in this chapter.
3. Press in the locking latches ❶ and remove the failed hot-plug fan (either 1 or 2) from the module ❷.

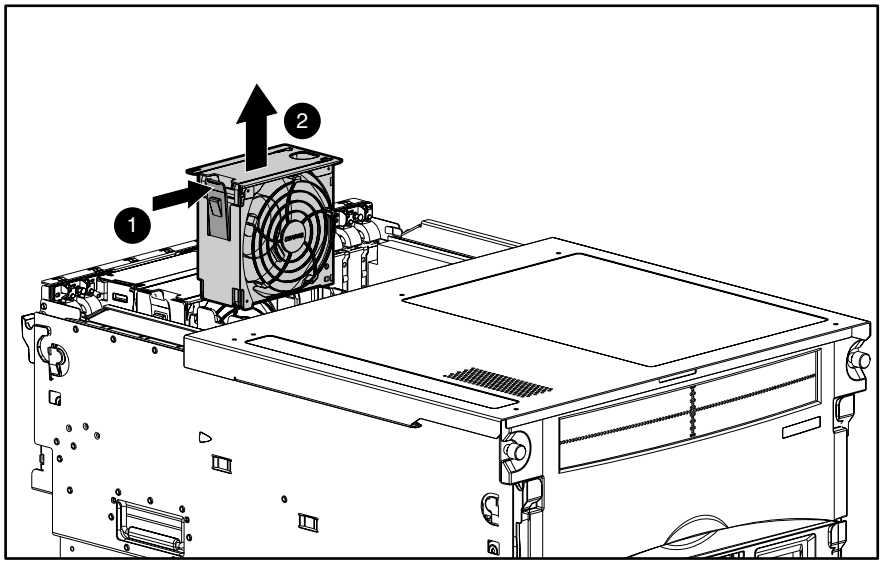

Figure 2-43. Removing a hot-plug fan

Reverse steps 1 through 3 to replace a hot-plug fan.

Fan Cage Assembly

To remove the fan cage assembly:

1. Perform the preparation procedures. See “Preparation Procedures” earlier in this chapter.
2. Remove the I/O module. See the sections on removing the I/O Modules earlier in this chapter.
3. Remove any PCI/PCI-X expansion boards in slots 10 and 11. See “Removing a PCI/PCI-X Expansion Board” earlier in this chapter.
4. Remove the hot-plug I/O fans. See “Hot-Plug Fans” earlier in this chapter.
5. Loosen the three screws securing the fan cage assembly to the I/O module ❶.
6. Remove the fan cage assembly ❷.

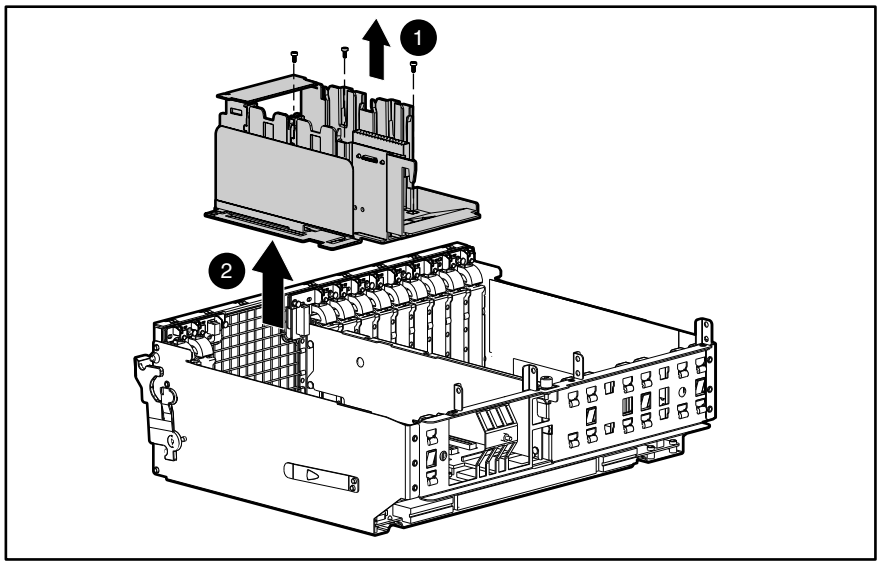

Figure 2-44. Removing the fan cage assembly

Reverse steps 1 through 6 to replace the fan cage assembly.

NOTE: The server boot block ROM is located underneath the fan cage assembly.

I/O Module Central Support Bracket

To remove the I/O module central support bracket:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Remove the I/O module. See the sections on removing the I/O modules earlier in this chapter.
3. Remove the fan cage assembly. See "Fan Cage Assembly" earlier in this chapter.
4. Loosen the thumbscrew securing the bracket to the chassis ❶.
5. Remove the bracket ❷.

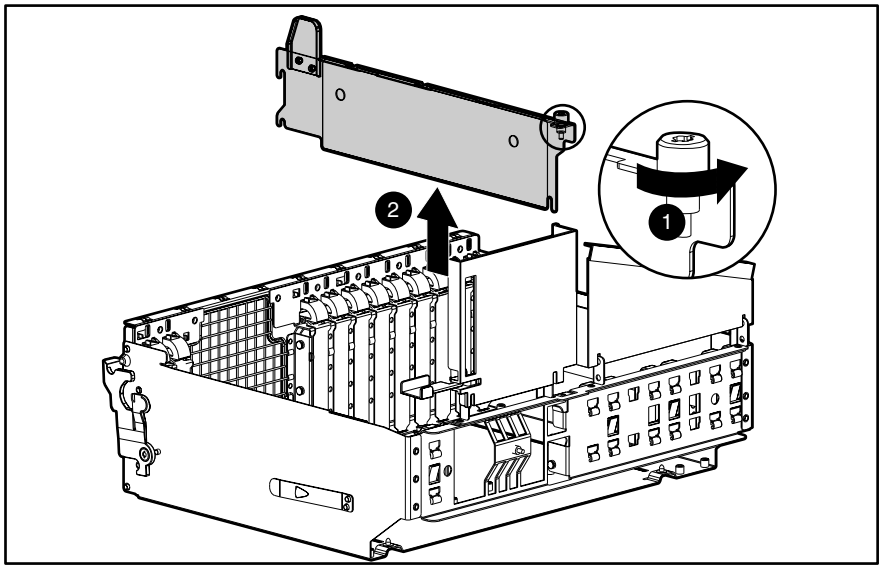

Figure 2-45. Removing the I/O module central support bracket

Reverse steps 1 through 5 to replace the I/O module central support bracket.

I/O Plenums

The I/O module is installed with three plenums. There is a fan cage plenum, a 2-slot plenum that covers slots 10 and 11, and a 9-slot plenum that covers slots 1 through 9. There is an air baffle over the 9-slot plenum.

Removing the Air Baffle and 9-slot Plenum

To remove the air baffle and 9-slot plenum:

1. Lift up the air baffle ❶, and flex each end to release the catches ❷.
2. Remove the air baffle ❸.

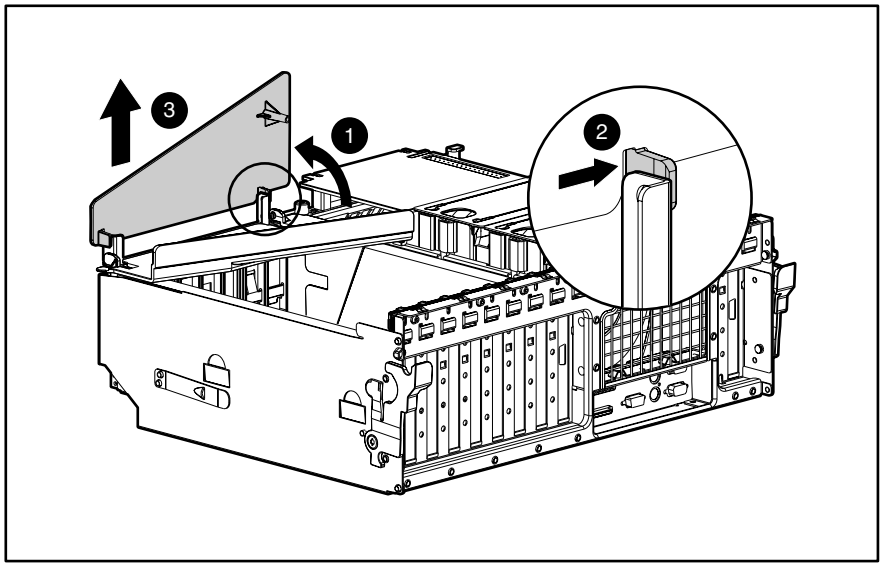

Figure 2-46. Removing the air baffle

3. Lift up the 9-slot plenum ❹, and flex each end to release the catches ❺.
4. Remove the 9-slot plenum ❻.

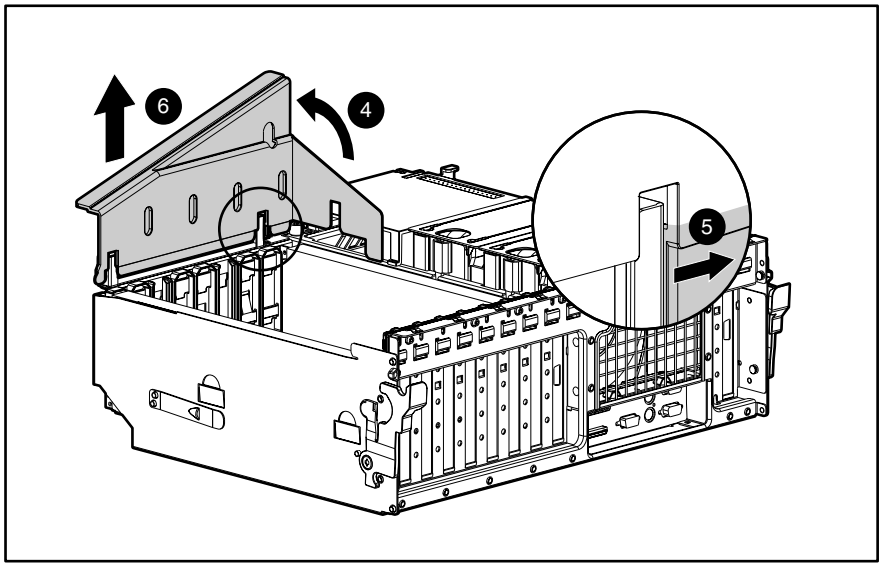

Figure 2-47. Removing the 9-slot plenum

Reverse steps 1 through 4 to replace the I/O plenum and air baffle.

Removing the Fan Cage Plenum

To remove the fan cage plenum from the I/O module:

1. Lift up the fan cage plenum ❶, and flex each end until the catches are released ❷.
2. Remove the plenum ❸.

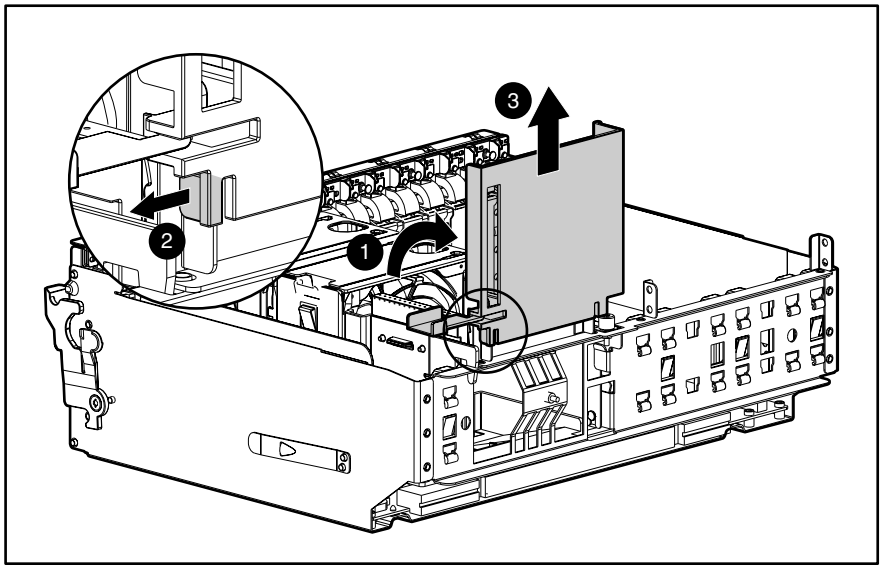

Figure 2-48. Removing the fan cage plenum

Reverse steps 1 and 2 to replace the fan cage plenum.

Removing the 2-Slot Plenum

To remove the 2-slot plenum:

1. Locate the 2-slot plenum attached to the side of the fan cage plenum.
2. Remove the fan cage plenum. See “Removing the Fan Cage Plenum” earlier in this chapter.
3. Slightly separate the fan cage plenum walls that trap the 2-slot plenum.
4. Remove the 2-slot plenum.

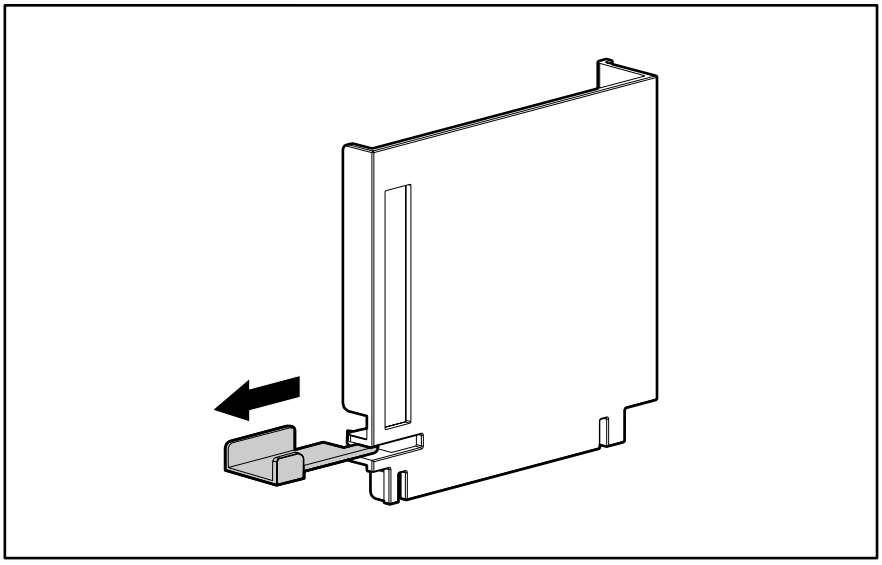

Figure 2-49. Removing the 2-slot plenum

Reverse steps 1 through 4 to replace the 2-slot plenum.

Internal Battery

WARNING: Your computer contains an internal Lithium cell battery. There is risk of fire and burns if the battery pack is incorrectly replaced or not handled properly. To reduce the risk of personal injury, do not attempt to recharge the battery. Do not expose to temperatures higher than 60°C. Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water. Replace only with the Compaq spare designated for this product.

CAUTION: Replace the battery within 15 minutes of removal to avoid data loss.

To remove the internal battery:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Open the top access panel. See "Top Access Panel" earlier in this chapter.
3. Locate the battery on the I/O board behind slots 10 and 11.
4. Pull the battery out of the battery socket ❶.

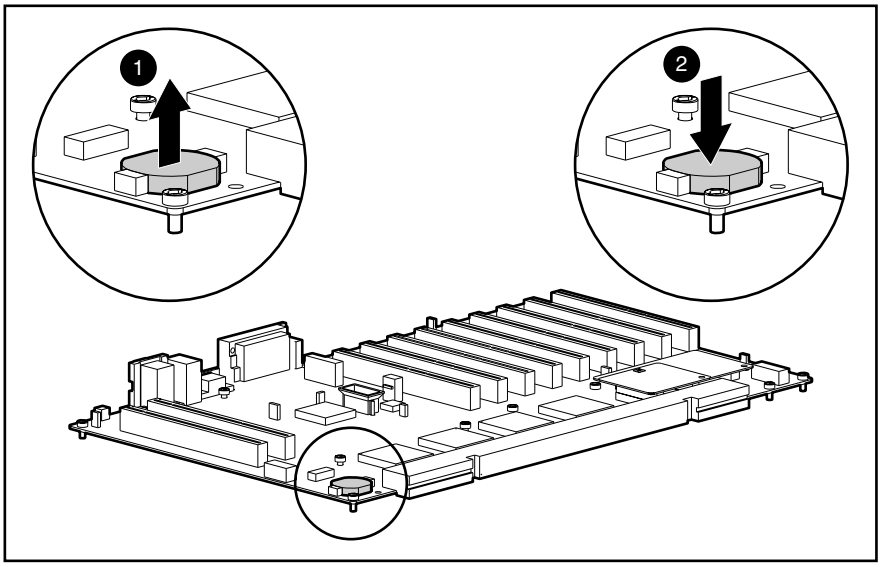

Figure 2-50. Removing the internal battery (fan guide and other plastics not shown)

Reverse steps 1 through 4 to replace the battery ❷.

CAUTION: Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to Compaq, your authorized Compaq Partners, or their agents.

Hot-Plug Power Supply and Midplane Assembly

Compaq ProLiant DL760 servers support up to two hot-plug, redundant power supplies.

Hot-Plug Power Supply

The system power in the Compaq ProLiant DL760 server does not have to be shut off to replace one of the power supplies.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Install the power supply before connecting the power cord to the power supply.
- Unplug the power cord before removing the power supply from the server.

To replace a hot-plug power supply with the system power on:

1. Remove the power cord from the power supply to be replaced and release the power cord clamp.

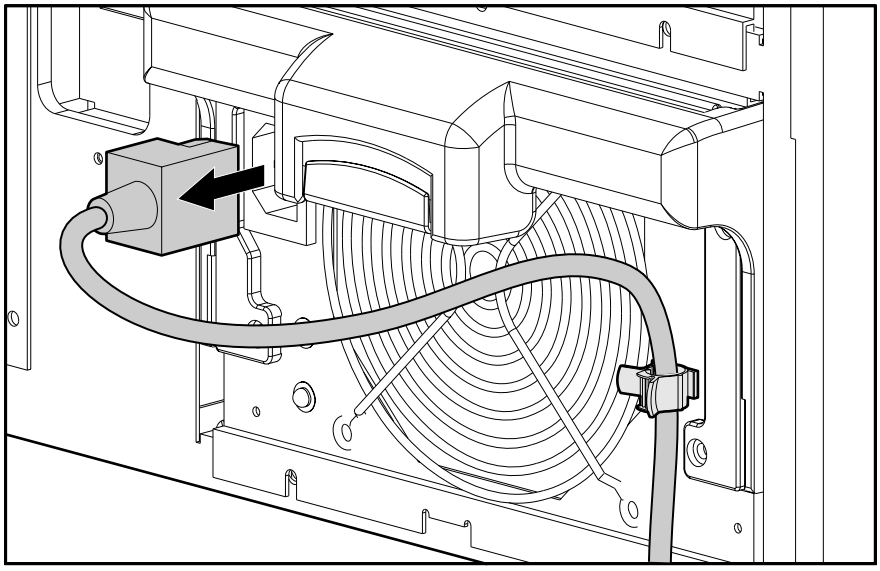

Figure 2-51. Removing the power cord

2. Squeeze upward on the release tab in the middle of the power supply handle ❶.
3. Rotate the power supply handle down ❷ and slide the power supply out of the chassis ❸ as shown in Figure 2-52.

IMPORTANT: Use only the power supply part number for the Compaq ProLiant DL760 server. Power supplies from other servers will not fit.

NOTE: When you remove the power supply, a spring-loaded trap door closes to block the opening. This door preserves the air path required to cool the internal components of the server.

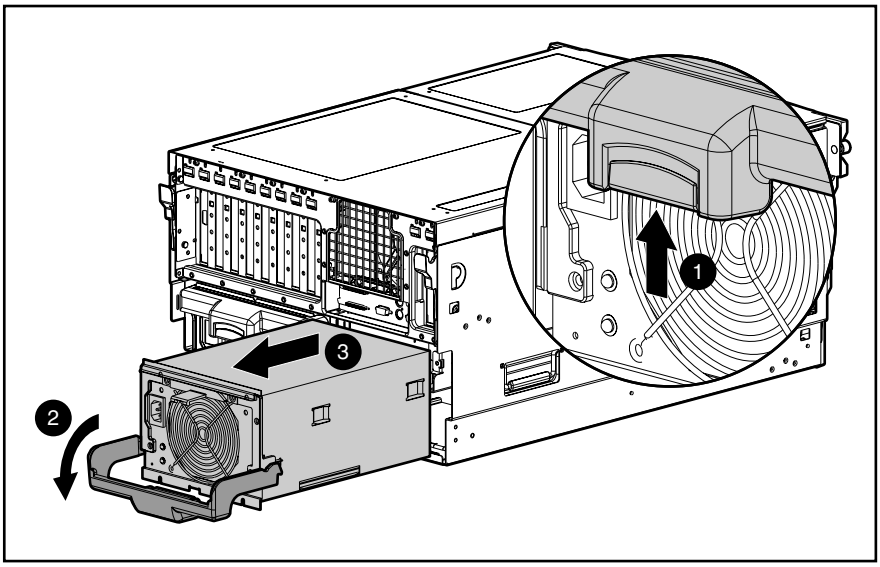

Figure 2-52. Removing a hot-plug power supply

Reverse steps 1 through 3 to replace the hot-plug power supply.

System Midplane Assembly

The system midplane assembly is the board that the power supply connects to.

To remove the system midplane assembly:

1. Perform the preparation procedures. See "Preparation Procedures" earlier in this chapter.
2. Open the top access panel. See "Top Access Panel" earlier in this chapter.
3. Remove and disconnect all modules and power supplies. See the sections, "Removing the Media Module," "Removing the I/O Module," and "Hot-Plug Power Supply."
4. Loosen the two thumbscrews securing the system midplane assembly to the chassis ❶.
5. Remove the board from the chassis ❷.

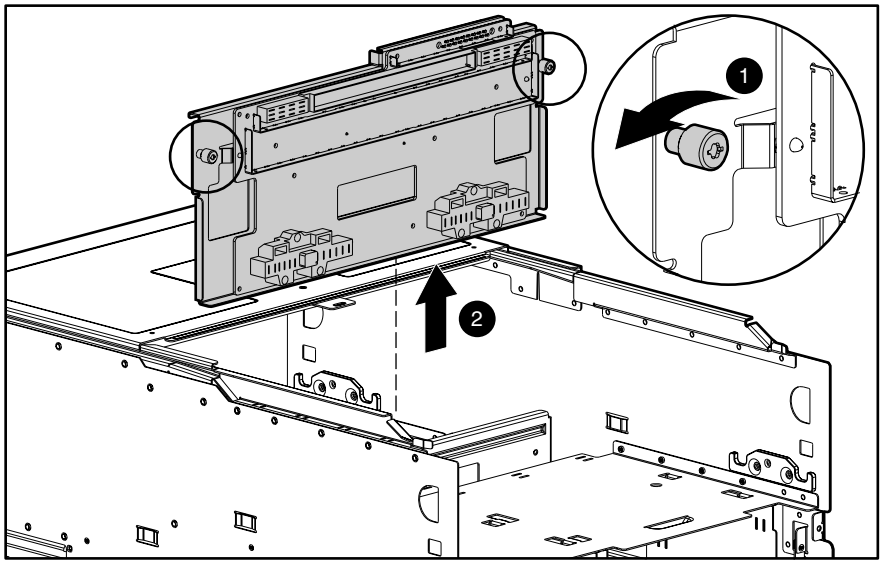

Figure 2-53. Removing the system midplane assembly

Reverse steps 1 through 5 to replace the system midplane assembly.

Chapter **3**

Diagnostic Tools

This chapter provides an overview of the software and firmware diagnostic tools available for Compaq ProLiant DL760 servers.

Diagnostic Tools Utility Overview

The following utilities were developed to assist in diagnosing problems, testing the hardware, and monitoring and managing Compaq server hardware.

Table 3-1
Diagnostic Tools

Tool	What it is	How to run it
Compaq Diagnostics	Compaq Diagnostics assists in testing and/or verifying operation of Compaq hardware. If problems are found, Compaq Diagnostics isolates failures down to a replaceable part, whenever possible.	Diagnostics and utilities are located on the system partition of the hard drive, and must be accessed when a system configuration error is detected during Power-On Self-Test (POST). For a complete list of POST error messages, refer to the *Compaq Servers Troubleshooting Guide*.
Compaq Inspect Utility	The Inspect Utility provides a report detailing system information	Run the Inspect Utility from the Compaq Diagnostics program.
Compaq Insight Manager™	A client/server application used to remotely manage Compaq hardware in a network environment. Reports hardware fault conditions (both failure and prefailure) and collects data for reporting and graphing.	For more information, refer to the Compaq Management CD and the *Compaq Insight Manager User Guide*.
Compaq Survey Utility	An online information gathering agent that runs on servers, gathering critical hardware and software information from various sources. A utility for servers running Windows NT or NetWare. If a significant change occurs between data gathering intervals, previous information is marked, and the survey text file is overwritten to reflect the latest configuration and changes since last configuration. This process creates a historical record of change events for server hardware and software.	Install the Survey Utility from SmartStart, the Compaq Integration Maintenance Utility, or the Compaq Management CD.

continued

Table 3-1
Diagnostic Tools *continued*

Tool	What it is	How to run it
ROM-based Setup Utility (RBSU)	The ROM-based Setup Utility allows you to change the system configuration settings from the initial startup of the system. Specifically, it provides: ■ "Virtual Presence" allowing a system administrator to use the Compaq Remote Lights-Out Edition to remotely access and configure the system in a totally unattended fashion ■ The ability to immediately save settings ■ Selection of operating system. It also allows configuration of system specific options such as COM ports and LPT ports, standard boot order, and NUMLOCK ■ Viewing of installed PCI devices and configures IRQ (interrupt) settings for each installed PCI device ■ Viewing and changing of the system date and time ■ Viewing and setting of configuration options for Automatic Server Recovery (ASR) ■ The ability for the server passwords to be set or changed ■ Setting or customization of the server asset tag and the text that will be displayed on the IMD ■ Setting of advanced options such as MPS/APIC Mode, Hot-plug Reservation, and CPU Correction Marking ■ Selection of the language for RBSU (English, French, Italian, German, Spanish, or Japanese)	On an unconfigured server, powering up the server causes RBSU to run automatically. On an already configured server, pressing **F9** when prompted after restarting the server will cause RBSU to run.

continued

Table 3-1
Diagnostic Tools *continued*

Tool	What it is	How to run it
Array Diagnostics Utility (ADU)	ADU is a Windows-based tool designed to run on all Compaq systems that support Compaq array controllers. The two main functions of ADU are: ■ To collect all possible information about the array controllers in the system ■ To generate a list of detected problems. This tool is available for all Compaq servers covered by this guide.	Use the information provided in the Array Diagnostics Utility (ADU). For a complete list of ADU error messages, see the *Compaq Servers Troubleshooting Guide*.
Drive Array Advanced Diagnostics (DAAD)	The predecessor to ADU, DAAD is a DOS-based tool for Compaq servers with Smart Array Controllers. DAAD collects information about the array controllers in the system and offers a list of detected problems.	For a list of Compaq servers still supported by this tool, visit the Compaq website: http://www.compaq.com
Integrated Management Log (IML)	IML is a log of system events, such as system failures or nonfatal error conditions. View events in the Integrated Management Log from within: ■ Compaq Insight Manager ■ Compaq Survey Utility ■ Operating system-specific IML utilities	The Integrated Management Log requires Compaq operating system-dependent drivers. Refer to the Compaq Support Software CD for instructions on installing the appropriate drivers.

For More Information

For detailed information about each of these diagnostic tools, see the *Compaq Servers Troubleshooting Guide*.

Chapter **4**

Connectors, Switches, and LED Indicators

The graphics and tables in this section show the connector locations on the rear panel, I/O board, and processor board of the Compaq ProLiant DL760 server.

Connectors

Rear Panel

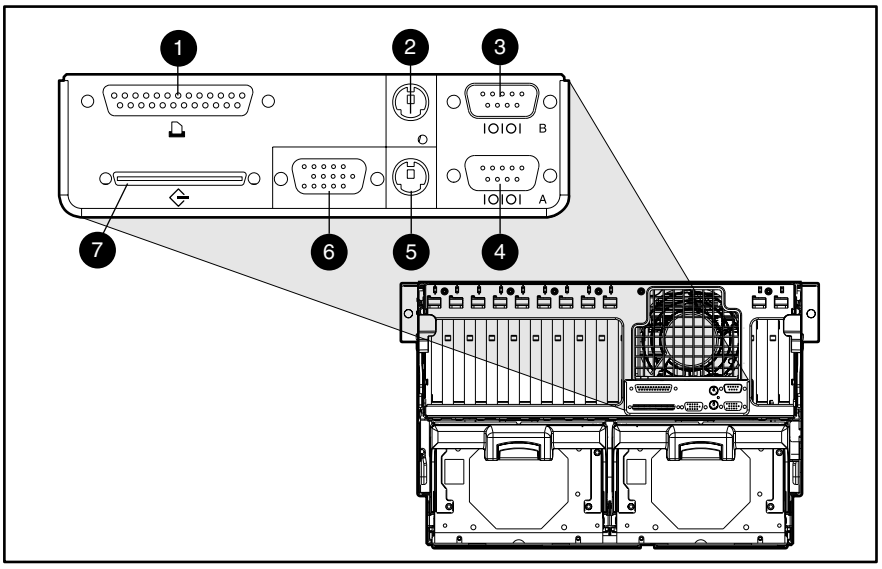

Figure 4-1. Rear panel connectors

Table 4-1
Rear Panel Connectors

Item	Description
❶	Parallel port
❷	Keyboard connector
❸	Serial port B
❹	Serial port A
❺	Mouse connector
❻	Video connector
❼	External Ultra2 tape port connector

I/O Board

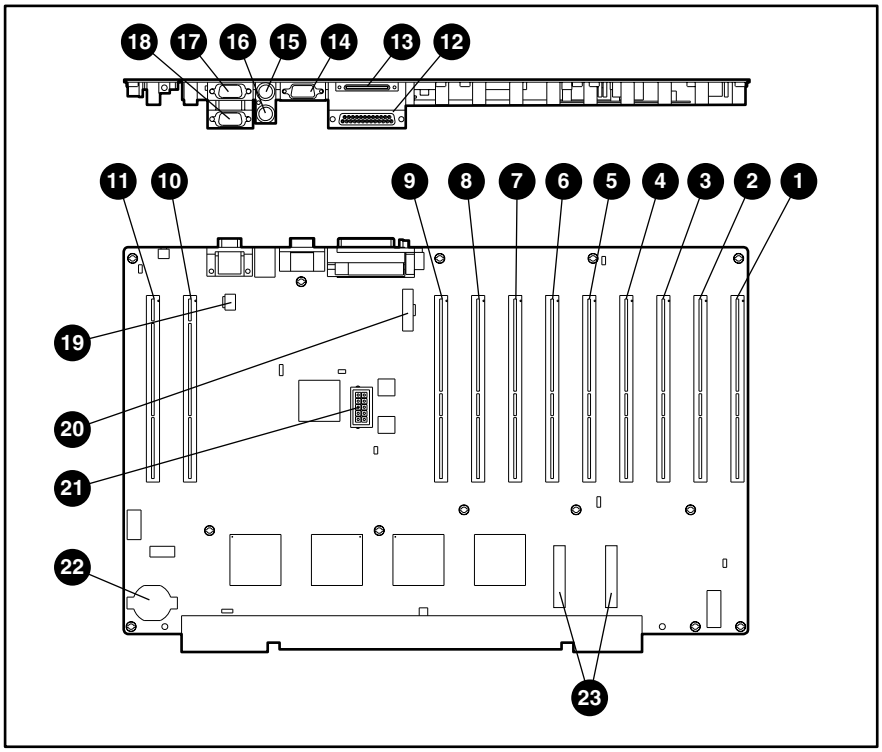

Figure 4-2. I/O board components

Table 4-2
I/O Board Components

Item	Description	Item	Description
❶–❻	Secondary 64-bit PCI/PCI-X Hot Plug slots	⓱	Serial port A connector
❼–❾	Primary 64-bit PCI Hot Plug slots	⓲	Serial port B connector
❿–⓫	Tertiary 64-bit PCI/PCI-X Hot Plug slots	⓳	PCI Hot Plug 2-slot connector
⓬	Parallel port connector	⓴	PCI Hot Plug 9-slot connector
⓭	External Ultra2 tape port connector	㉑	Fan assembly connector
⓮	Video connector	㉒	NVRAM battery
⓯	Mouse connector	㉓	Array enabler connectors
⓰	Keyboard connector		

Processor Board

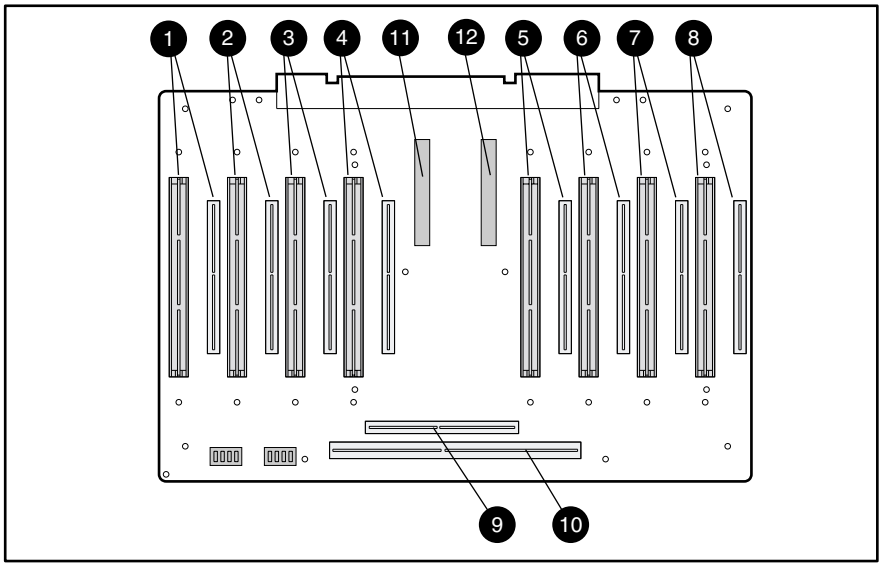

Figure 4-3. Processor board connectors

Table 4-3
Processor Board Connectors

Item	Connector
❶–❽	Processor and Processor Power Module
❾	Processor bus termination power module
❿	Memory board
⓫	Bus 1 Cache Accelerator
⓬	Bus 2 Cache Accelerator

Switches

This section contains graphics and tables showing switch locations and settings on the processor board.

I/O Board Switches

The I/O board configuration switchbank (SW1) ❶ is located on the I/O board. Table 4-4 describes the function of each switch.

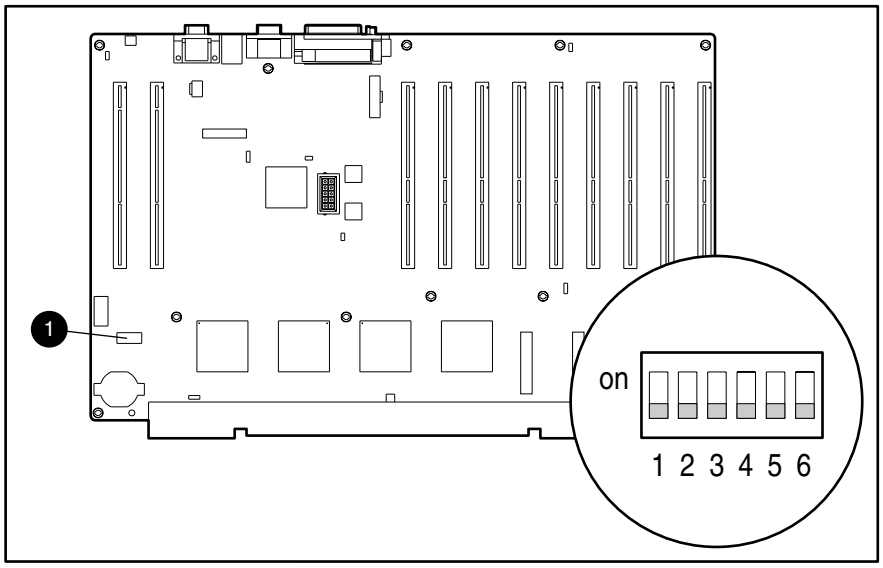

Figure 4-4. I/O board switchbank (default settings shown)

Table 4-4
I/O Board Configuration Switch Settings (SW1)

Switch	Function	Enable	Disable	Default
S1	On-board video	OFF	ON	OFF
S2	Configuration lock	ON	OFF	OFF
S3	Rack-mount	-	-	ON
S4	Diskette boot override	ON	OFF	OFF
S5	Boot password	OFF	ON	OFF
S6	Clear NVRAM	ON	OFF	OFF

Processor Board

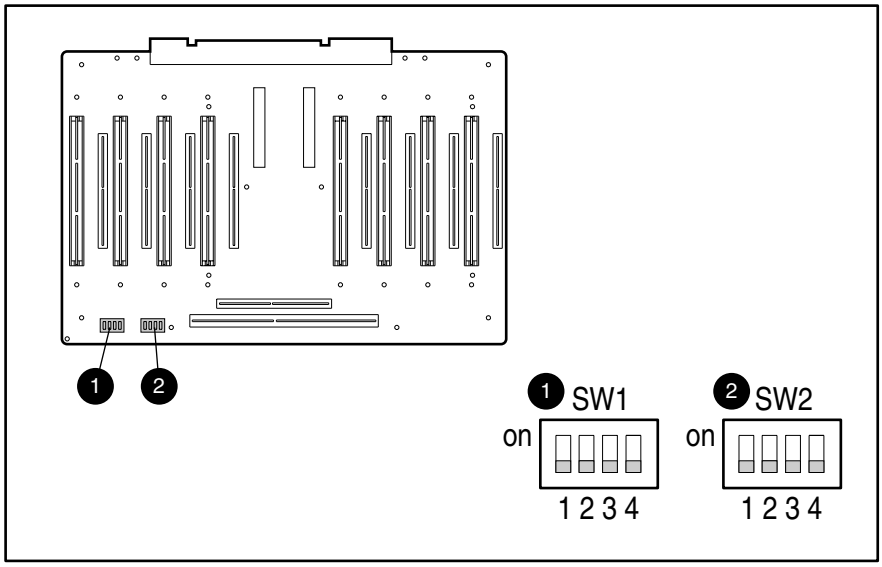

Figure 4-5. Processor board switches

Table 4-5
Processor Board Switches

Item	Component
❶	SW1 Bus 1 bus/core ratio
❷	SW2 Bus 2 bus/core ratio

SW1 - SW4 Processor Board Bus/Core Frequency Ratio

Processor board bus/core frequency ratio switches can be set manually or by the system ROM. Figure 4-5 shows the location of the processor board bus/core frequency ratio switches. Table 4-6 shows the bus/core frequency ratio switch settings.

CAUTION: Setting the processor switchbanks incorrectly can result in permanent damage to the processor or in data loss.

CAUTION: The server will NOT boot if the Intel Pentium III Xeon processors are NOT the same speed.

IMPORTANT: The bus/core switches are delivered set at the Off position. This default setting allows the ROM to automatically set the optimal speed for the buses. The server will not start if the switches are set to a speed higher than the slowest processor.

NOTE: When all bus/core frequency switches are set to the Off position, the system ROM will automatically set the bus/core frequency.

Table 4-6
SW1–SW4 Bus/Core Frequency Ratio

Bus/Core Frequency	Ratio	SW 1	SW 2	SW 3	SW 4
550	5 ½	OFF	OFF	OFF	ON
700	7	ON	OFF	ON	OFF
900	Auto	OFF	OFF	OFF	OFF
ROM Default	Auto	OFF	OFF	OFF	OFF

NOTE: The Intel Pentium III Xeon 900 MHz processors bus/core frequency ratio comes locked from Intel. These processors automatically run at 900 MHz regardless of the bus/core frequency ratio switch settings. Compaq recommends leaving these settings in the default positions.

LED Indicators

This section contains graphics and tables showing LED locations and functions on the system interconnect status indicators, hot-plug I/O fan, PCI Hot Plug LED Indicators, hot-plug power supply, and hot-plug SCSI hard drive.

System Interconnect Status Indicator LEDs

Figure 4-6 and Table 4-7 show the location and identification of the system interconnect status indicator LEDs.

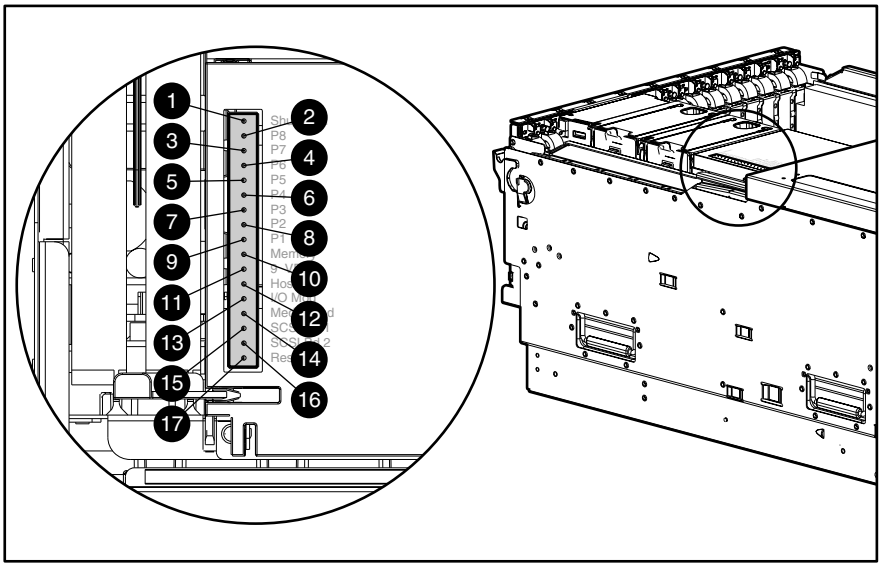

Figure 4-6. System interconnect status indicator LEDs

Table 4-7
System Interconnect Status Indicators

Indicator	Component	Indicator	Component
❶	Emergency shutdown	❿	Memory board
❷	Processor – MP8	⓫	Processor Power Module
❸	Processor – MP7	⓬	Processor and Memory Module
❹	Processor – MP6	⓭	I/O module and fans
❺	Processor – MP5	⓮	Media module
❻	Processor – MP4	⓯	SCSI backplane 1
❼	Processor – MP3	⓰	SCSI backplane 2
❽	Processor – MP2	⓱	Reset
❾	Processor – MP1		

IMPORTANT: To check system interconnect status indicator LEDs, place the server in Standby mode with the power supplies plugged in.

Hot-Plug I/O Fan LED Indicators

The ProLiant DL760 server ships with two hot-plug fans. Fan 1 is closest to the rear of the server. Each fan has LED indicators that indicate the following fan statuses:

- No light—Power is not applied to the fan.
- Green light ❶—Power is applied to the fan, and the fan is functional.
- Amber light ❷—The fan has failed.

Figure 4-7 shows the location and identification of the hot-plug fan LEDs.

NOTE: The hot-plug fan LED indicators are not part of the fan housing. Figure 4-7 shows the LED indicators as if the fan were installed in the server.

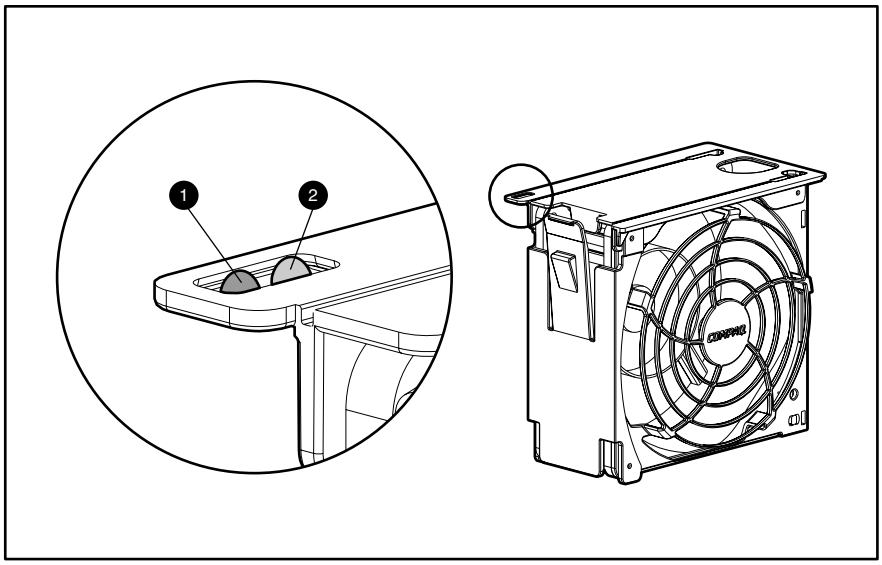

Figure 4-7. Hot-plug I/O fan LEDs

CAUTION: Never remove both hot-plug fans while the server is powered up. Overheating and damage to hardware could result. If the appropriate Compaq software drivers are installed, the operating system software will initiate a power shutdown if overheated.

PCI Hot Plug LED Indicators

The PCI Hot Plug amber LED ❶ and green LED ❷ indicators (shown in Figure 4-8, for one slot) provide a visual reference of the status of the corresponding slot. The LEDs are viewed from the rear of the server or by opening the top access panel.

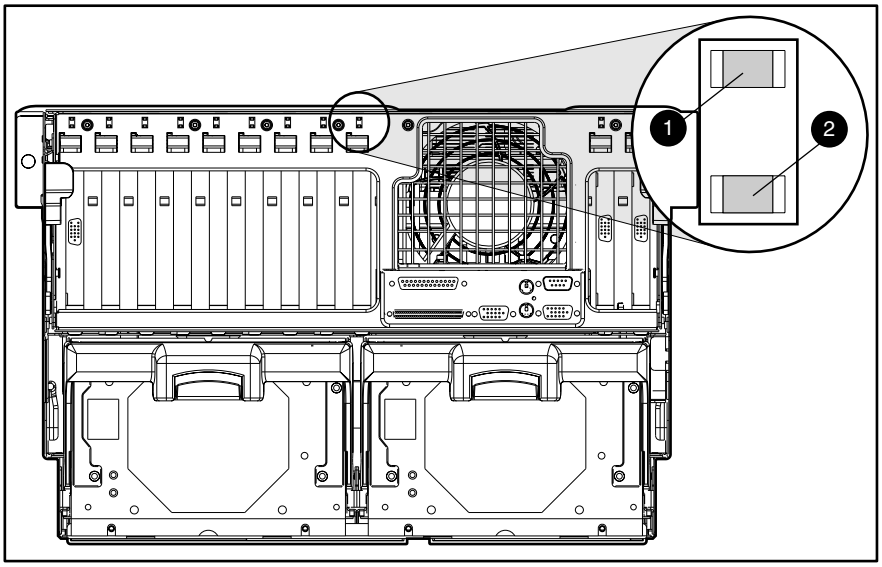

Figure 4-8. PCI Hot Plug LED indicators from rear of server

Each PCI Hot Plug button ❸ is used to activate or deactivate its associated PCI Hot Plug slot. Activating or deactivating a PCI Hot Plug slot can also be accomplished through the operating system PCI Hot Plug software application. For more information, refer to the *Compaq ProLiant DL760 Server User Guide*, and the "PCI Hot Plug Important Facts" section in the online *PCI Hot Plug Administration Guide* on the server documentation CD.

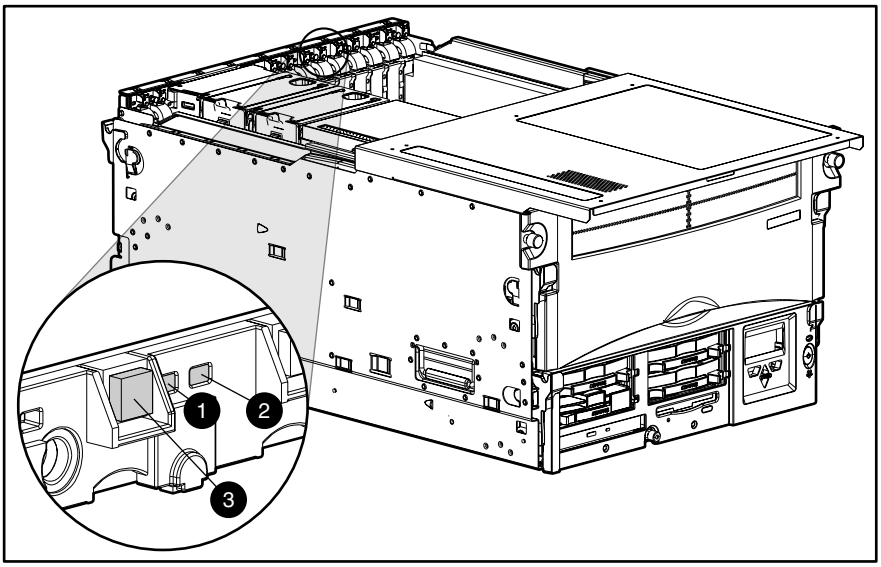

Figure 4-9. PCI Hot Plug LED indicators in the I/O module

Table 4-8 shows the appropriate slot condition and status for each state of the two PCI Hot Plug LEDs.

Table 4-8
PCI Hot Plug LED Indicators and Button

❷ Green LED	❶ Amber LED	OK to Open	Slot Condition and Status
On	Off	No	Power is on. The slot does not require attention.
On	On	No	Power is on. The slot requires attention. There may be a problem with the slot, the PCI/PCI-X board, or the driver. Do NOT open the slot release lever. Refer to the IML and/or the PCI Hot Plug software application for a description of the problem indicated.
Flashing	Off	No	Power to the slot is being turned off or on. This process may take several minutes. DO NOT open the slot release lever until the green LED is completely off.
Off	On	Yes	Power is off. You may replace or remove a board in this slot depending on the operating system. (If Windows NT or Windows 2000, this device requires attention).
Off	Off	Yes	Power is off. You can replace or remove the board in this slot only.
❸ PCI Hot Plug Button			Used to activate and deactivate the associated PCI Hot Plug slot.

Power Supply LED Indicators

Figure 4-10 and Table 4-9 show the location of power supply 1 ❶ and power supply 2 ❷ with a description of both power supply LED indicators.

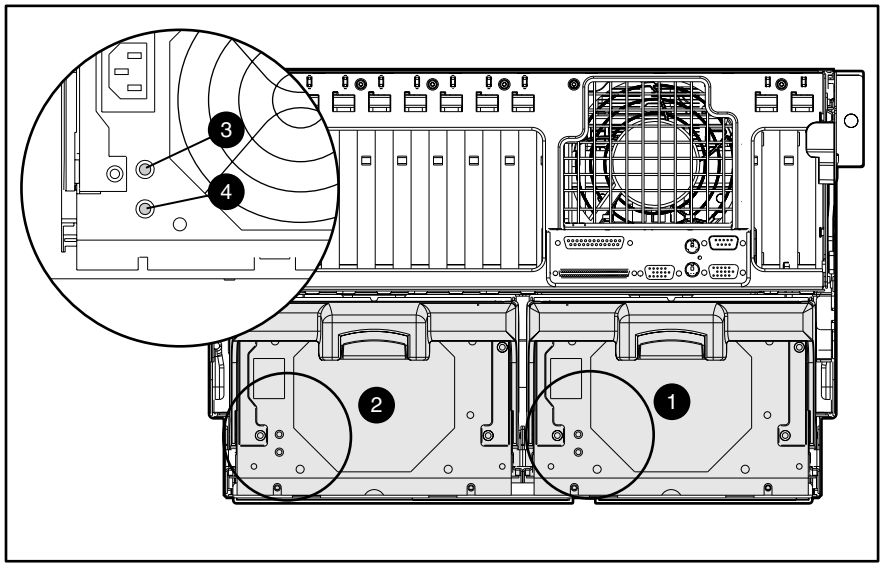

Figure 4-10. Power supply LEDs

Table 4-9
Power Supply Indicators

Item	Condition	Meaning
❸ Status ⚠	Green	Normal operation.
	Green/Amber alternating	Power supply failed to restart after a prolonged fault.
	Green flashing	Power supply will restart within 20 seconds.
	Amber	Fault detected in this power supply.
	Amber flashing	Power supply failed self-test.
	Off	System is in standby mode or interlocks are disabled.
❹ AC Power ☼	Green	AC power is connected to this power supply.
	Off	No AC power is connected to this power supply.

Hot-Plug SCSI Hard Drive Indicators

The hot-plug SCSI hard drive LED indicators, located on each physical drive, are visible on the front of the server or external storage unit. They provide: ❶ Activity, ❷ Power/Online, and ❸ Fault status for each corresponding drive when configured as a part of an array and attached to a powered-on controller. Their behavior may vary, depending on the status of other drives in the array.

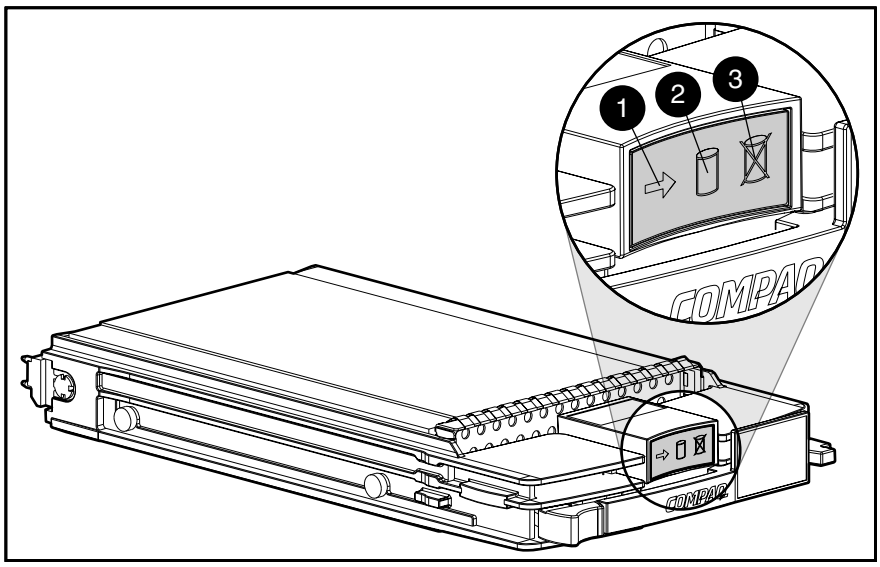

Figure 4-11. Hot-Plug SCSI hard drive indicators

Chapter 5

Physical, Operating, and Performance Specifications

This section provides physical, operating and performance specifications for the following components of the Compaq ProLiant DL760 server:

- System unit
- Power supply
- Dual inline memory module (DIMM)
- 1.44-MB diskette drive
- 24X Max (or higher) IDE CD-ROM drive (low profile)
- Hot-pluggable Wide Ultra2 and Wide Ultra3 SCSI hard drives
- Compaq Integrated Smart Array Controller
- Fast Ethernet dual port controller (64 PCI)

System Unit

Table 5-1
System Unit Specifications

Dimensions	
Height	30.83 cm (12.14 inches)
Width	48.26 cm (19.0 inches)
Depth	69.72 cm (27.45 inches)
Weight (no drives and two power supplies)	50 kg (110 lb)
Temperature range	
Operating	10° to 35°C (50° to 90°F)
Nonoperating	-30° to 60°C (-20° to 140°F)
Shipping	-30° to 50°C (-22° to 122°F)
Maximum wet bulb temperature	38.7°C (101.7°F)
Input requirements (per power supply)	**Low Range/High Range**
Rated input voltage	100 to 120V/200 to 240V
Rated input frequency	47 to 63 Hz/47 to 63 Hz
Rated input current	8 A/10 A
Rated input power	740W @ 110V/1700W @ 220V
Power supply output power (per power supply)	**Low Range/High Range**
Rated steady-state power	500W/1150W
Maximum peak power	540W/1150W
Relative humidity range (noncondensing)	
Operating	20% to 80%
Nonoperating	5% to 90%
Heat dissipation	
Maximum heat output (system is configured to draw maximum power)	5309 Btu/h/1555W

Power Supply

Table 5-2
Power Supply Specifications

General specifications	
Full output rating	To 40°C and 1,525 m (to 104°F and 5,000 ft)
	To 32°C and 3,050 m (to 90°F and 10,000 ft) (derate linearly)
Minimum load	1.0 A on + 5V output 1.0 A on + 12V output 0.5 A on + 3.3V output
Ambient temperature range	
Operating	10° to 40°C (50° to 104°F)
Storage	-40° to 65°C (-40° to 149°F)
Input specifications	**Low Range/High Range**
Nominal line voltage	100 to 120 VAC/200 to 240 VAC
Range input line	90 to 132 VAC/180 to 265 VAC
Frequency range	47 to 63 Hz/47 to 63 Hz
Power factor	0.95/0.95
Input power	500W @ 110V/750W @ 220V
Input current	8 A at 100 VAC/10 A at 200 VAC
Inrush current	<70 A at 132 VAC (cold start)/<70 A at 132 VAC (cold start)
Holdup time	20 ms from zero crossing at 120 VAC/20 ms from zero crossing at 120 VAC
Dielectric voltage withstand	
Input to output	3000 VAC per minute/3000 VAC per minute
Input to ground	1500 VAC per minute/1500 VAC per minute
Input transient susceptibility	
Common and differential mode (superimposed on AC line)	2500V, 10 μs pulse
Differential mode	20% step change in AC input voltage

Dual Inline Memory Module (DIMM)

Table 5-3
DIMM Specifications

Size	128MB, 256MB, 512MB, or 1 GB
Speed	60 ns or faster
Upgrade requirement	Bank of two DIMMs; must be same type, size, speed, and manufacturer
Type	Buffered ECC protected DIMMs; SDRAM

1.44-MB Diskette Drive

Table 5-4
Diskette Drive Specifications

Size	3.5 inches
LED indicators (front panel)	Green
Read/write capacity per diskette (high/low density)	1.44 MB/720 KB
Drives supported	1
Drive height	1/3
Drive rotation	300 rpm
Transfer rate bits per sec (high/low)	500/250 K
Bytes per sector	512
Sectors per track (high/low)	18/9
Tracks per side (high/low)	80/80
Access times	
Track-to-track (high/low)	6 ms/3 ms
Average (high/low)	174 ms/94 ms
Settling time	15 ms
Latency average (high/low)	100 ms/83 ms
Cylinders (high/low)	80/80
Read/write heads	2

24X Max IDE CD-ROM Drive

Table 5-5
24X Max IDE CD-ROM Drive Specifications

Dimensions	
Height	4.29 cm (1.69 inches)
Width	15.0 cm (5.75 inches)
Depth	20.8 cm (8.19 inches)
Weight	1200 g (2.66 lb)
Operating conditions	
Temperature	5° to 45°C (41° to 113°F)
Humidity	10% to 80%
Applicable disk	CD-ROM (mode 1 and 2), CD-DA, CD-XA (mode 2, form 1 and 2), photo CD (single-session and multi-session), mixed mode (audio and data combined)
Capacity	550 MB (mode 1, 12 cm) 640 MB (mode 2, 12 cm)
Block size	2048, 1024 bytes (mode 1) 2340, 2336, 1024 bytes (mode 2) 2352 bytes (CD-DA) 2328 bytes (CD-XA)
Diameter	12 cm, 8 cm (4.7 inches, 3.15 inches)
Rotational speed	4200 rpm maximum
Center hole thickness	15 mm (0.6 inches)
Track pitch	1.6 µm
Data transfer rate	
Sustained	150 KB/s (single)
Variable	1200-3600 KB/s (8X to 24X)
Data transfer method	32-bit bus master PCI
Access times (typical)	
Full stroke	200 ms
Random	100 ms
Cache/buffer	128 KB
Startup time (typical)	> 7 s
Stop time	> 4 s

continued

Table 5-5
24X Max IDE CD-ROM Drive Specifications *continued*

Audio output level	
Line out	0.7 VRMS at 47 Ohms
Headphone	0.6 VRMS at 32 Ohms (maximum width)
Laser parameters	
Type	Semiconductor laser GaA1As
Wave length	780 +/- 25 nm
Divergence angle	53.5° +/- 1.5°
Output power	0.14 mW
Interface	IDE (ATAPI)

Hot-Plug Ultra2 SCSI Hard Drives

Table 5-6
Hot-Plug Ultra2 SCSI Hard Drives

	9.1-GB	**18.2-GB**
Capacity	9100.0 MB	18209.8 MB
Height	1/3, 1.0 inch	1/2, 1.0 inch
Size	3.5 inches	3.5 inches
Interface	Wide Ultra2 SCSI	Wide Ultra2 SCSI
Transfer rate	80 MB/s	80 MB/s
Seek time (typical, including setting)		
Single track	0.8 ms	0.8 ms
Average	7.9 ms	6.9 ms
Full stroke	17.0 ms	15.0 ms
Rotational speed	7,200 rpm	7,200 rpm
Physical configuration		
Bytes/sector	512	512
Logical blocks	17,773,524	35,566,080
Operating temperature	10° to 35°C 50° to 95°F	10° to 35°C 50° to 95°F

Hot-Plug Ultra3 SCSI Hard Drives

Table 5-7
Hot-Plug Ultra3 SCSI Hard Drives

	9.1-GB	18.2-GB	36.4-GB	9.1-GB	18.2-GB
Capacity	9100.0 MB	18209.3 MB	36419.3	9100.0 MB	18209.3 MB
Height	1.0 inches	1.0 inches	1.0 inches	1.0 inches	1.0 inches
Size	3.5 inches	3.5 inches	3.5 inches	3.5 inches	3.5 inches
Interface	Wide-Ultra3 SCSI	Wide-Ultra3 SCSI	Wide-Ultra3 SCSI	Wide-Ultra3 SCSI	Wide-Ultra3 SCSI
Transfer rate	160 MB/s	160 MB/s	160 MB/s	160 MB/s	160 MB/s
Seek time (typical, including setting)					
Single track	0.8 ms	0.8 ms	0.9 ms	0.7 ms	0.7 ms
Average	5.0 ms	5.2 ms	5.7 ms	3.9 ms	3.9 ms
Full stroke	12.0 ms	12.0 ms	12.0 ms	12.0 ms	12.0 ms
Rotational speed	10,000 rpm	10,000 rpm	10,000 rpm	15,000 rpm	15,000 rpm
Physical configuration					
Bytes/Sector	512	512	512	512	512
Logical blocks	17,773,524	35,565,080	17,773,524	17,773,524	35,565,080
Operating temperature	10° to 35°C 50° to 95°F	10° to 35°C 50° to 95°F	10° to 35°C 50° to 95°F	10° to 35°C 50° to 95°F	10° to 35°C 50° to 95°F

Compaq Integrated Smart Array Controller

Table 5-8
Compaq Integrated Smart Array Controller Specifications

Temperature range	
Operating	10° to 35°C (50° to 95°F)
Shipping	-30° to 60°C (-22° to 140°F)
Relative humidity range (noncondensing)	
Operating	20% to 80%
Nonoperating	5% to 90%
Maximum drives supported	4
Logical drives supported	32
Simultaneous drive transfer channels	1
Data transfer method	64-bit PCI bus master
Total transfer rate	80 MB/s (80 MB/s per channel)
SCSI electrical interface	Low-voltage differential (LVD) and single-ended
PCI bus transfer rate (maximum)	133 MB/s
SCSI port connectors (internal and external)	PCI 64D Extended SCSI connector
Protocol	Wide Ultra2 SCSI
SCSI electrical interface	Low-voltage differential
Software upgradable firmware	Yes
Read cache	12 MB
Reliability features	
Cache battery backup	No
Online capacity expansion	Yes
Logical drive capacity extension	Yes
Online RAID level migration	Yes
Online stripe size migration	Yes
Automatic data recovery	Yes
Distributed data guarding (RAID 5)	Yes
Data guarding (RAID 4)	No
Data mirroring (RAID 1)	Yes
Drive striping (RAID 0, 0 + 1)	Yes

Compaq NC3134 Fast Ethernet NIC 64 PCI Dual 10/100 Controller

Table 5-9
Fast Ethernet Controller Specifications

Network interface	10Base-T/100Base-TX
Compatibility	IEEE 802.3/802.3u compliant
Data transfer method	32/64-bit PCI bus master
Network transfer rate: 10Base-T (half-duplex), 10Base-2 10Base-T (full-duplex) 100Base-TX (half-duplex) 100Base-TX (full-duplex)	 10 MB/s 20 MB/s 100 MB/s 200 MB/s
Connectors (2)	RJ-45
I/O address and interrupt	Automatic configuration
Cable support: 10Base-T 100Base-TX	 Categories 3, 4, or 5 UTP (2 or 4 pair); up to 100 meters (328 feet) Category 5 UTP (2 pair); up to 100 meters (328 feet)
Operating system driver support	Novell NetWare Server 4.x and 5.x Microsoft Windows NT 4.0 Microsoft Windows 2000 SCO OpenServer 5.x UnixWare 7.x

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